

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

GRADUATE PROGRAM IN PROJECT MANAGEMENT

SUPPORTED DISTANCE LEARNING PROGRAM

ASSESSMENT ON THE CAUSES AND EFFECTS OF PRICE ESCALATION OF BUILDING CONSTRUCTION: IN THE CASE OF ADDIS ABABA DESIGN AND CONSTRUCTION WORKS BUREAU

A PROJECT WORK IS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES IN ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS SCHOOL OF COMMERCE, IN A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN PROJECT MANAGEMENT.

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Addis Ababa Ethiopia

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Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

Declaration

I the undersigned, declare that this project work is my original work and has not been conducted or executed for a title of Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau. In Addis Ababa University College of business and economics school of commerce, and that all sources of materials used for the research work have been duly acknowledged.

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Date: July, 2023

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

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ABSTRACT

In order to effectively manage major capital construction projects, it is necessary to coordinate a vast array of organizational, technical, human, and natural resources. Cost has been shown to be a key determinant of project success. One of the many issues that the construction sector is now dealing with is price escalation. The building construction projects in Addis Ababa Design and Construction Works Bureau (AADCB) has, in recent years, encountered a serious challenge due to price escalation that threatened the ability of the construction sector to deliver projects within budgeted cost, at stipulated time and at satisfactory quality. Accordingly, this paper aims to assess the causes and effects of price escalation of building construction projects in the case of Addis Ababa Design and Construction Works Bureau, to identify problems of price escalation and adjustment and methods to manage/administer price escalation on Addis Ababa Design and Construction Works Bureau (AADCB), which can serve as the way forward for future work in coping with these escalations. The data required for this study were collected through questionnaires. The statistical method of Relative Importance Index and Spearman's correlation coefficient were used to analyze the collected data through questionnaires. Based on the finding's variables were ranked according to their occurrence. In addition, the respondent's correlation in ranking variables was studied in order to identify the agreements between respondents. Poor estimation, improper planning and/or improper implementation of proper planning and project schedule changes are identified as major internal causes of price escalation and also increase in material cost/material price fluctuation, fluctuation in money exchange rates and limited capacity of material producers are identified as major external causes of price escalation of construction projects in Addis Ababa Design and Construction Works Bureau. Findings revealed that the major effects of price escalation are higher project costs, cash flow (project financing) problem of the projects, delay and dispute among parties. The study also identified uncompensated increase in cost of construction materials, construction price indices may over estimate or under estimate the market conditions as at how prices have risen and selection of the most suitable index in using inflation indices are identified as major problems of price escalation and adjustment in Addis Ababa Design and Construction Works Bureau. Finally, based on the analysis of the results, recommendations have been proposed that enables to minimize the problems of price escalation and adjustment on Addis Ababa Design and Construction Works Bureau and favors the construction industry for better performances.

Key words: price escalation, price adjustment, construction price index.

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LIST OF ABBREVIATIONS

BaTCoDA	Building and Transport Construction and Design Authority
CBSN	Central Bureau of Statistics Netherland
CPA	Contract Price Adjustment
CPAP	Contract Price Adjustment Provisions
CPI	Consumer Price Index
DBST	Double Bituminous Surface Treatment
DS	Design Standard
EEA	Ethiopian Economic Association
ETB	Ethiopian Birr
EUROSTAT	Statistical Office of the European Community
FIDIC	Fédération Internationale des Ingénieurs-Conseils
ICB	International Competitive Bidding
INSEE	Institut National de la Statistique et des Etudes Economiques
MDB	Multilateral Development Banks
MoI	Ministry of Infrastructure
MoWUD	Ministry of Works and Urban Development
NCB	National Competitive Bidding
OECD	Organization for Economic Co-operation and Development
PPA	Public Procurement Agency
PPPAA	Public Property Procurement and Administration Agency
PPI	Producer Price Index
PMBOK	Project Management Body of Knowledge
RII	Relative Importance Index
VAT	Value Added Tax

CHAPTER ONE

1. Introduction

1.1. Background

The role the construction industry plays in socio-economic development is significant. The industry is a distinct sector of the economy, which makes its direct contributions to economic growth (MoWUD, 2006). It provides the basis upon which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services. The construction industry in Ethiopia is challenged by several problems which tend to confront the sector and thus making efforts at developing the construction industry is very difficult and complex. The underlying problems of the construction sector can be classified into two main categories. The first one can be related to the consequences of the fact that the sector is not viewed and planned in an integrated manner, but rather, operates with fragmented, unrelated and often conflicting components (Wubishet, 2004). The second problem is related to deficiencies and market price fluctuation of the inputs required for the construction (Gebre-Michael, 2002 in Asteway, 2008).

Project cost escalation is a major problem for government agencies. Over the time span between the initiation of a project and the completion of construction many factors influence a project's final costs (Flyvbjerg et al., 2002).

Building construction sector is one of the largest sectors in Ethiopian construction industry. Recognizing the importance of the building facilities in supporting social and economic growth and its role as a catalyst to meet poverty reduction targets, the Government has placed increased emphasis on improvement of the quality and extent of building infrastructure in the country. In the context of Ethiopia's geography, pattern of settlement and economic activity, building plays a vital role in facilitating economic development. In particular, it is building infrastructure that provides the means for the living of people, utilization of land and natural resources, improved agricultural production and marketing, facilities to social services, and opportunities for sustainable growth (MoWUD, 2006).

This research work will attempt to review the current price escalation administration practice in Ethiopia and to identify their causes and effects of price escalation and propose recommendation particularly with focus on Addis Ababa City.

It is anticipated that the findings of this thesis will contribute towards the identification of the causes of price escalation and their impact on the construction industry as well as increasing the awareness of construction managers on price escalations in general, and building construction cost management in particular.

1.2. Statement of the problem

Today's construction projects require modern construction technique, technological equipment's, qualified professionals and large amounts of modern construction materials. Therefore, too much amount of money is required and invested to implement the project. In addition, this much money is fall under risk since construction business is risky one. Unless the project is not successfully implemented in the given quality, cost and time, the failure of it may cause serious damage (moral as well as financial) among the contracting parties.

The construction industry in Ethiopia is challenged by several problems which tend to confront the sector and thus making efforts at developing the construction industry is very difficult and complex (Asteway, 2008). One of the fundamental difficulties of Ethiopian construction sector is associated to scarcity and market price fluctuation of the inputs required for the construction (Gebre-Michael, 2002).

The unpredictably occurring sharp price increases lead contractors into failure to complete their projects within the acceptable margin of time and quality for the client; and fail to complete within the planned cost margin for themselves (Asteway, 2008). The study of Asteway (2008) explains that in recent years, the price fluctuation of construction inputs in Ethiopia has become severe and unpredictable.

Despite the prevailing nature of price fluctuation, the Ethiopian government devaluated the Ethiopian Birr by 15% effective on October, 2017 (The Reporter, 2017). According to the assessment made by The Reporter (2017), there are significant increments in the price of construction materials following the devaluation of the currency.

Material resources are the heart and life wire of any building system. This simply means that increase in the cost of materials will affect the total cost of construction (Amos et al., 2018). Increase in the prices of building materials has multiplier effects on the industry as it leads to fluctuation in construction costs and the eventual abandonment of projects (Jagboro and Owwoeye, 2004).

Generally, escalation in the price of construction material had significantly influenced the building construction in Addis Ababa and since the market is dynamic, similar problems may occur in the future.

1.3. Research Questions

1. What are the causes and effects of price escalation on building construction in Addis Ababa City design and construction works bureau?
2. What are the problems of price escalation and adjustment on building construction in Addis Ababa City design and construction works bureau?
3. What are the possible methods/measures to manage price escalation and avoid/minimize the negative impacts on Addis Ababa design and construction works bureau?

1.4. Objectives of the Study

1.4.1. General objective

The objective of this research is to investigate the problems of price escalation and adjustment on Addis Ababa City construction projects constructed by the bureau and favors the construction building for better performances.

1.4.2 Specific objective

- i. To assess the causes and effects of price escalation on building construction industry in Addis Ababa City design and construction works bureau.
- ii. To identify problems of price escalation and adjustment on building construction in Addis Ababa City design and construction works bureau.
- iii. To identify methods/measures to manage price escalation and avoid/minimize the negative impacts on building construction projects in Addis Ababa City design and construction works bureau.

1.5. Significance of the Study

The importance of this research paper stated as follows. First, it may benefit the different stakeholders involving in construction projects in general and particularly on building construction projects related to price escalation. Second, it helps owners, contractors and consultants to know price escalation problems mainly occur in building construction projects and to take remedial measures to reduce its impacts once the problems occur. Third, it identifies the factors which lead to the occurrence of price escalation problems and the methods to manage price escalation in building construction projects in the city.

1.6. Scope of the Study

The scope of the study is bounded by three main characteristics location, sector and project management. In terms of location this study is covered only in Addis Ababa. Only Clients, Contractors and Consultants who work in this country are participated in the survey. None of the questionnaires was conducted in other locations. Regarding this area the scope of the research is limited to assess causes and effects of price escalation, to identify price escalation and adjustment problems and methods to manage/administer price escalation for project success as well as response relationship among respondents.

1.7. Organization of the Thesis

The thesis is organized with five chapters. The first chapter begins the basic research information as an introduction part of the research. The literature review is dealt in chapter two followed by the third chapter which covers research design and methodology in order to achieve the objectives of the study. The fourth chapter encompasses the analysis of findings and discussion part. The last chapter comprises the conclusions made and recommendations forwarded based on the major findings of the study.

CHAPTER TWO

2. Literature Review

2.1. Construction Industry

The construction industry is the main engine driving the country's economy because it is the means through which development is accomplished. The increasing complexity of infrastructure projects and the environment within which they are constructed place greater demand on construction managers to deliver projects on time, within the planned budget and with high quality (Enshassi et al., 2003).

The construction industry, according to Abebe (2003), employs around 20% of the labor force and accounts for 30% of the capital budgets of governments in developing nations. Wubishet (2004) cited in Turkey (2011) in his work, however, indicated that the construction industry accounts even for more than 50% of the capital budget in developing countries. According to him, for instance, in Ethiopia (1997/98 to 2001/02), the industry accounted for 58.2% of the capital budget. It should be noted, in both cases, that the industry covers a fairly large portion of the government's capital expenditure and so it needs to be developed.

Although the idea of assembling materials and products serves as the primary definition of building, it actually encompasses a variety of tasks. A diverse set of people must work together to complete the project, just as many elements must come together to construct a structure. To bring together numerous independent businesses and corporate personalities in to one goal oriented process is the particular challenge of the construction industry (Frederick and Nancy, 2009).

According to Chitkara (2004) cited in Fetene (2008) construction project is a mission, undertaken to create a unique facility, product or service within the specified scope, quality, time, and cost.

Projects are transitory endeavors carried out to offer a distinctive good or service, according to the PMI's 2004 project management guide. According to Sanvido et al. (1992), construction projects are completed as a result of a variety of events and interactions, both planned and unplanned, that occur over the course of a facility's life with shifting participants and processes in a dynamic environment.

In developed and developing countries, the construction industry plays a major role in the economy by contributing significantly to the gross domestic product, employing a sizable portion of the working population, accounting for about half of the capital formation, and interacting strongly with other sectors of the economy (Hillebrandt, 1985 in Salleh, 2009).

Ethiopia's building industry has been undergoing change, according to Wubishet (2005). This transformation is based on improving the competitiveness of the construction industry and enhancing its ability to fulfill the national development demands. To reveal such transformation

is vital to understand the contextual realities and the development trends of the Ethiopian construction industry.

2.2. Price Escalation

Due to competition for resources and skilled employees, the construction sector has been expanding at an exceptionally variable rate recently, and this trend is anticipated to continue. This situation has created a great deal of uncertainty and nervousness among construction field. The financial success of a construction project can be uncertain and at risk due to changes in escalation rates during construction (Bates, 1996). The success of a building construction project is mainly influenced by to what extent of cost escalation identified and allocated to the construction project. Budgeting for cost escalation is a major problem in the planning phase of projects (Dawood and Bates, 1998).

Literature demonstrates that a wide range of risk factors affect construction costs and causes a significant rise in project expenses over the initial budget. This is frequently referred to as cost escalation, cost overrun, or cost growth and is expressed as a percentage of the expected cost. It happens for a variety of reasons, some of which are connected to one another but all of which are linked to different risks (Avots, 1983 and Garry, 2006 in Turkey 2011).

2.3. Price Escalation: Definitions

Different scholars defined project price escalation in construction industry in their works and some of them are outlined as follow:

Price Escalation is an increase in the cost of any construction elements of the original contract and base cost of a project due to passage of time (Williams et. al., 1999).

Price Escalation is the increase in any element of project costs when the cost of that element is compared between two different periods (Lock, 2003).

Price Escalation is the provision in a cost estimate for increases in the cost of equipment, material, labor, etc., due to continuing price changes over time (Jaeger, 1996).

Price Escalations, which mainly include the increase in the amount of resources in actual or estimated, direct costs of labor and material (Stewart, 1982), are usually treated with provisions and some form of compensation that considers price level changes over time.

The term "price escalation" was interchangeable among academics. Price escalation is defined for the sake of this study as an increase in the cost of equipment, material, labor, etc., due to continuing price changes over time.

2.4. Construction Contract

A construction contract is a binding agreement, enforceable in law, containing the conditions under which the construction of a facility will take place. According to Ostwald (2001), the element of risk, the willingness of the parties, the competition, complexity of construction, and urgency may influence the general type of contract selected.

The different types of construction contracts directly affect how much a project will cost. Similar to this, the project's contract type also directly affects the compensation in the event of a price change (Tadesse, 2006 in Asteway, 2008).

2.5. Construction Price Indices

According to Remer et al. (1998) and OECD (1994(a) and 1994(b)), construction price indices are calculated by the statistical directorates of countries to meet the demand arising from the need to assess real changes in the output from these activities (i.e. to create a constant value series) which cannot be derived solely through reference to regular building and construction statistics. However, in Ethiopia, the indices needed to employ such a formula are not being produced constantly, hence in order to use the method, proxy indices from vendors or the government is required. In the absence of trustworthy indices, a simplified version of the formula using only the published consumer price index may be used. Sources and types of proxy indices could include a cement factory for cement, a minimum wage for local labor, a government-published fuel price for fuel, etc.

According to OECD (1996) the development and compilation of price indices for construction activity is a complex procedure consisting of a long and varied set of operations. The usefulness of the construction indices compiled also depends on having a clear understanding of the purposes of the indices, and the characteristics of the construction industry in the country where it is located.

The Statistics Directorate of OECD (1994, (a and b)) and EUROSTAT, (1995 and 1996) notes that construction price indices are primarily used for analysis of price movements and price formation in the construction industry, for price escalation clauses in construction contracts, and for deflation of components of the national accounts.

In extensive terms, construction price indices provide measures of changes in the prices of either the inputs to, or outputs of, construction activity. Besides, according to SSI Turkey (2002), construction price indexes may be used for two distinct purposes:

- The deflation of current expenditure on construction projects to provide estimates of construction expenditure at constant prices.
- As a measure of one component of inflation.

2.6. Types of Construction Price Indices

Depending on the need for the index, various index number compilation techniques are employed. According to Lynn Mackenzie (1994), there are two basic categories of construction price indices. These are input price indices and output price indices.

2.6.1. Input Price Indices

Input price indices measure changes in the price of inputs to the construction process by monitoring separately the cost of each factor. This generally entails the compilation of a weighted index of the costs of wages and materials (CBSN, 1995).

According to Lynn Mackenzie (1994), Input price indices only provide a reflection of changes in the prices of construction inputs. The index is based on prices of a representative selection of basic inputs (labor, plant, materials and transport) that go into the construction work. Hence, the input price index measures the change in the cost of resources to the contractor, and not the change in the price that the client pays (INSEE, 1990).

2.6.2. Output Price Indices

Output price indices assess changes in the prices of what is produced by entities engaged in construction activity. Output price indices cover most of the items normally built into the price paid by purchasers or clients to entities involved in producing the completed output of the construction activity. These generally include materials, labor, equipment hire, land preparation costs, overheads, profits, and trade margins (INSEE, 1990).

For the construction sector, output price indices are product of price indices. They measure changes in prices paid by clients or purchasers to entities producing construction output. Output price indices take into account changes in productivity, and contractors' profit margins in addition to the input costs. These indices are used to deflate the output value of the construction industry in the national accounts (CBSN, 1990). Output price indices do not include architects and engineers' fees, finance costs, selling expenses, VAT or the cost of the land.

2.7. Factors Causing Price Escalation

Price escalation is a significant issue in both industrialized and developing nations. Numerous analyses of significant projects demonstrate that price increase is common. The causes of price escalation in construction projects are varied, some are not only hard to predict but also difficult to manage (Morris, 1991).

Price escalation does not only occur during the planning and design phases of a project. Project cost growth often manifests itself during construction. Focusing early on internal factors will reduce cost growth at bid time or during construction (Anderson et al., 2006).

Mansfielld, Ugwu and Doran, 1994 (in Fetene, 2008) proposed that in developing countries the lack of proper phasing of construction projects can contribute to the economy to become „overheated“. This leads to shortage of construction materials as the demand will exceed the supply, this in turn leads to a climb in the cost of construction materials; this inevitably gives rise

to project cost overruns, with consequential effects on inflation and a decline on efficient activity in the construction industry.

Understanding the elements driving each one or where the factor originates helps one comprehend the price escalation factors better. With this knowledge, methods can be created to address these price escalation issues.

In general, there are two major classification strategies that can be used to group the price escalation variables. The two types of factors are internal and external (Warsame, 2006). The research's next section will go into detail on the variables that influence the price escalation of building projects.

2.7.1. Internal Factors Causing Price Escalation

According to Warsame (2006) internal factors are cost escalation factors that can be directly controlled by the project's sponsoring agency/owner. While numerous internal factors can lead to underestimation of project costs during the planning and design stages of development. The following primary internal factors are well documented (Anderson et al. 2006). Some of the factors are presented below.

A. Delivery/Procurement Approach

According to Harbuck (2004), the delivery/procurement approach affects how the agency/owner and the contractors divide risk, and when risk is transferred to a party that is unable to control a particular risk, project costs are likely to rise. The selection of the project delivery strategy, such as design-bid-build, design-build, or build-operate-transfer, as well as the procurement strategy, such as low bid, best value, or qualifications-based selection, has an impact on the transfer of project risks (NJDoT, 1999). Lack of experience with a delivery technique or procurement methodology, in addition to the issue of risk distribution, might result in an overestimate of project costs (Parsons, 2002).

B. Project Schedule Changes

Harbuck (2004) asserts that the delivery/procurement approach influences how the agency/owner and the contractors distribute risk and that project costs are likely to increase when risk is passed to a party that is unable to control a specific risk. The project risk transfer is impacted by the choice of the project delivery strategy, such as design-bid-build, design-build, or build-operate-transfer, as well as the procurement strategy, such as low bid, best value, or qualifications-based selection (NJDoT, 1999). An overestimation of project expenses may be caused by inexperience with a delivery strategy or procurement methodology, as well as the problem of risk distribution (Parsons, 2002).

C. Engineering and Construction Complexities

Callahan (1998) notes that Engineering and construction complexities caused by the project's location or purpose can make early design work very challenging and lead to internal coordination problems and project component errors. Internal coordination problems can include conflicts or problems between the various disciplines involved in the planning and design of a project (Touran et al., 1994). Constructability problems that need to be addressed may also be encountered as the project develops. If these issues are not addressed appropriately, cost increases are likely to occur (Allen et al., 1995 and Federal-Aid, 2003).

D. Poor Estimation

Underestimating project costs might result from poor estimation. Documentation for estimates must be presented in a way that can be read, checked, validated, and corrected. The formats, practices, and methods utilized to determine the cost form the basis of a good estimate (Arditi et al., 1985). Poor estimation includes general errors and omissions from plans and quantities as well as general inadequacies and poor performance in planning and estimating procedures and techniques (Merrow, 1988). Errors can be made not only in the volume of material and services needed for project completion but also in the costs of acquiring such resources (Harbuck, 2004 and Carr, 1989).

A study by Hester et al. (1991) indicates that the estimating method and the accuracy of project cost estimates could be a major reason for having cost changes (cited in Turkey, 2011).

E. Inconsistent Application of Contingencies

According to Donnell (2005), incorrect application of contingencies is a key cause of project price escalation since it makes it unclear exactly what is covered by contingency amounts and what is included in the estimate's line items.

Additionally, Donnell (2005) stated that contingency funds are typically meant to cover a variety of possible events and problems that are not specifically identified or to account for a lack of project definition during the preparation of early planning estimates.

Inconsistent use of contingency can lead to cost overruns during the project's final design or construction phases as well as underestimating throughout the planning and preliminary design stages (Noor & Tichacek, 2004). Contingency funds are improperly used to construction cost rises during project construction and are subsequently unavailable for their intended use (Ripley, 2004).

The level of project risk contingency in estimates has a major impact on their financial outcomes for clients. If contingency is too high it might encourage poor cost management, cause the project to be uneconomic and aborted, or lock up funds that is not available for other projects (Dey, 2001). On the other hand, if the contingency allocation is too low, then it may be too rigid

and set an unrealistic financial environment, resulting in unsatisfactory performance outcomes (Touran et al., 2004 in Turkey, 2011).

F. Ambiguous Contract Provisions

Uncertain contract conditions, according to Harbuck (2004), dilute ownership and lead to miscommunication between an owner and the project design and construction contractors. Lack of information in the project papers may result in cost increases during project implementation (Chang, 2002). Forecast accuracy cannot be attained when the fundamental presumptions underpinning an estimate are clouded by confusing contract conditions (Callahan, 1998).

G. Improper Planning and/or Improper Implementation of Proper Planning

It is a reality that the higher authorities plan most things with their mindset in mind. Planning is said to be incorrect if it is done without knowledge of the actual situation. Since the implementation will be handled by those who are in actual situations. Sometimes good plans are made by planners, but they fall flat because of the implementers. A variety of factors will cause the construction cost to increase if it is projected at the planning stage (Dainty et al., 2001).

2.7.2. External Factors Causing Price Escalation

External cost escalation elements are those whose effects are outside the direct control of the agency or owner. However, while estimating project expenses, the agency or owner must take these into account. During the planning and design phase of project development external factors can lead to underestimation of project costs (Warsame, 2006). These factors dealt with as follows.

A. Local Concerns and Requirements

Schroeder (2000) states that regional issues and demands may have an impact on project costs at the execution stage. Mitigation measures imposed by the local government, neighborhoods, businesses, as well as local and national environmental groups during the construction of a project can, similar to the effects during the planning and design phases, lengthen the project's duration and affect inflation allowances or increase direct costs. Project cost increases may result from agencies or owners failing to anticipate these changes (Daniels, 1998; Mackie and Preston, 1998).

B. Inflation

In simpler terms, inflation results from a rise in the amount of money in circulation while the number of products available for purchase does not rise proportionately (Pickrell, 1992). More consideration will need to be given to anticipated inflationary price rises over time the longer the anticipated building period. Initial cost estimates will need to allow for the value that will need to be paid at the time the project actually goes ahead. Inflation can act to increase the original estimates of construction costs. Inflation may have been taken into account in the original

estimates, but if the rate of inflation increases above the predicted level during the construction period, then the original cost estimate will be exceeded. Obviously, any other factor that delays a project will expose the project to the risk of further inflationary cost increases (Hufschmidt and Gerin, 1999).

The time value of money can adversely affect projects when:

- the project completion is delayed and therefore the cost is subject to inflation over a longer duration than anticipated; and/or
- the rate of inflation is greater than anticipated in the estimate. The industry has varying views regarding how inflation should be accounted for in the project estimates and in budgets by funding sources (Merrow, 1988).
- project estimates are not communicated in year-of-construction costs;

C. Market Conditions

The expenses of a project, especially big projects, can be impacted by market conditions. It would be challenging for contractors to choose the ideal level of overhead expenses that would allow them to successfully bid on and manage projects in an uncertain construction market (Drew and Skitmore, 2001). Inaccurate assessment of the market conditions can lead to incorrect project cost estimating. Market conditions affect the project costs during the execution phase similar to the effects during the planning phase (Woodrow, 2002). Changing market conditions during the construction of a project that reduces the number of bidders, affects the labor force, and other related elements can disrupt the project schedule and budget (chang, 2002).

D. Force Majeure

Various incidents that are frequently referred to be "Acts of God" are included under this umbrella term. They include political and economic instability, as well as upheavals such as war, riots, and harsh weather (Akinci and Fischer, 1998). The contractor is typically required to have insurance to protect against such occurrences. When they do happen, they typically result in lengthy delays and corresponding price hikes (Chang, 2002).

E. Change in Legislation

Change in legislation during the contract time of the project is one causes of price variation. These additional costs due to changes in legislation are considered during the contract and approved extended completion time. The changes in cost and legislation clause (clause70), in the FIDIC IV general condition of contract is intended to make provision for possible effect of such matters as variation in the cost of labor and materials arising during the execution of the works.

The issue of the effects of subsequent legislation on the construction project is raised in the basis of sub clause 70.7 of the special condition of contract in FIDIC IV. If the Contractors have incurred additional costs related to increment of sales tax, sur tax, VAT and other government

and custom taxes during the execution of the contracts caused by subsequent legislation, they are entitled to compensation of some amount to the additional cost incurred. The additional cost incurred due to subsequent legislation should be requested separately in addition to the additional cost due to price escalation.

F. Fluctuation in Money Exchange Rates

The exchange rate is particularly relevant if contracting services or other elements of the project are being purchased. If exchange rates change beyond the level predicted by the project sponsor (and the companies providing the services) then the cost of the project can increase. It can of course operate in the opposite way where the project sponsor takes advantage of a strengthening of his own currency.

A common finding of studies is that cost is affected by a large number of factors essentially demand and supply. However, Ogunsemi (2002) submits that in Nigerian Construction Industry in the recent past, many projects have been subjected to cost and time overruns. Considering the relationship between construction industry and the national economy, it becomes necessary that the cost of construction be within the reach of the average citizen. However, some economic indicators are very significant to the overall cost of construction. Some of these indicators include; exchange rate of local currency to other currencies in the world, inflation rate and interest rate charge on loan among others.

G. Increase in Global Demand for Construction Materials

One of the most fundamental factors determining the prices of any products or services including construction is the relationship between demand and supply in which the market prices are determined by the equilibrium conditions. However, this equilibrium is not static. It is determined by dynamic forces of the market and evolves over time as some sectors become more attractive than the others (Sanderson, 2006).

In the last decade, the capability of material sources has not increased as much as demand has increased. This gap in the supply-demand equilibrium has resulted in increases in material prices. Steel, asphalt, cement, and aggregates are some of the most strongly affected commodities (Ajibade, 2009).

H. Limited Capacity of Material Producers

The availability of material sources is falling short of the market demand. Some of the materials which are affected by this gap in demand and supply are cement, asphalt, and steel, among others. Material producers design the capability of their production facilities based on a prediction of future demand. If there is a large uncertainty in future demand, material producers typically design their production facilities short of expected demand (Damnjanovic, 2008).

I. Local or Municipal Regulations

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Local municipality regulations can affect project schedule. Local regulations restrict working hours. The disposal of waste, borrow-pits, and use of certain class of machinery is governed by local regulations, which are often stringent (Wimsatt, 2008).

J. Increase in Material Cost

Costs of materials and oil-based fuels significantly impact the overall price of bid items. With demand for construction in both domestic and international markets increasing in past several years, the prices of construction materials have also increased. This can be attributed to a number of factors including limited capacity to produce materials, lack of competition, and price of energy. In fact, the prices of some materials are in direct correspondence to the prices of oilbased fuels (e.g., asphalt) and energy in general (ACAF, 2008).

K. Shortage of labors / skilled workers

The current high volume of construction is creating a high demand for skilled construction workers. Labor shortages can have severe consequences especially sectors like construction, given the inter-relatedness of the production process and the backward and forward linkages that are involved (Henson and Newton, 1995). The shortages of skilled labor increase the contractor's risk, by increasing the likelihood of delay. The most obvious and direct consequence is that the construction job does not get started or completed in a timely fashion.

The causes of price escalation are listed in the following table from section 2.8 of the literature study as variables to be used in the survey.

Table-2.1: Identified causes of price escalation variables for use in the survey

No.	Internal Factors	External Factors
1	Delivery/procurement approach	Local concerns and requirements
2	Project schedule changes	Force Majeure
3	Engineering and construction complexities	Change in Legislation
4	Poor estimating	Fluctuation in money exchange rates
5	Inconsistent application of contingencies	Limited capacity of material producers
6	Ambiguous contract provisions	Local or municipal regulations
7	Improper planning and/or improper implementation of proper planning	Increase in material cost
8		Shortage of labors / skilled workers

2.8. Methods of Price Adjustment

Price adjustment is a method of transferring the risk associated with increasing material prices from the contractor to the contracting agency (Brown, 2011). Price adjustment allows the price of material to fluctuate without imposing additional risk to the agency or the contractor. The construction industry has been challenged with the rise of construction delivery costs which in some cases do not tally with the budgeted ones owing to the continuous and unpredictable change of the macroeconomic environment. Given such a situation, contractual clauses have been formulated to cater for optimum recovery of price escalations. Subsequently, various increased cost adjustment methods have been developed and reviewed from time to time (Finsen, 2005).

In projects of reasonably long duration (lasting over one year) undertaken in areas which suffer from persistent inflation, Employers consider it reasonable to compensate Contractors for losses which they might suffer as a result of increases in the prices of Labor, Materials, Fuel, Plant etc. There are a number of methods of calculating such CPA. Whichever method is used it usually provides for both increases and decreases in prices and can accordingly result in either an increase or a decrease in the contract price. Unfortunately, the norm is that CPA tends to be an escalation of the contract price (ERA, 2006).

Owing to its complex nature, domestic construction projects are accompanied by frequent price escalation due to rises of prices of materials, labor and equipment. There are two alternative methods commonly employed in the local context to determine such variations practiced in the construction industry. The first adjustment method is “Basic Prices” or proven cost method and the second are based upon “Price Indices” or adjustment method (ERA, 2006).

2.8.1. Basic Prices/Proven Cost Method

In using base date prices, the difference between the current date prices and base date prices will be established for each items allowed for adjustment.

When this method is used the Contractor is required, at tender stage, to list those elements of his costs which he requires to be subject to CPA. In support of this he includes a list of the actual costs and suppliers of the various elements upon which he based his tender. When the Contractor purchases these materials he presents proof of the actual price paid and receives compensation for the difference between the "Basic Cost" and the "Actual" invoiced cost of those same items. It is therefore important to ensure that all purchases are from the suppliers identified at the time of the tender. Any change in suppliers is likely to result in an invalid comparison of prices and accordingly overcompensation (ERA, 2006).

It is important, when using this method, that the Employer verifies the authenticity and reliability of the suppliers and prices quoted as the base prices. Any change in supplier is likely to result in different base prices, which will complicate the calculation of CPA.

Although this is the method generally used on European Union funded projects, it is not the preferred method as it has the potential for abuse by:

- Under quoting base prices.
- Over invoicing current prices.
- Changing suppliers.

2.8.2. Indices/Formula Method

The amount payable to the contractor shall be adjusted for rises or falls in the cost of labor, goods and other inputs to the Works, by the addition or deduction of the amounts determined by the adjustment formula.

With this method the works, to be undertaken, are mathematically described in a formula. The formula contains a number of factors representing the various elements of the project at the time of tender and a number of similar factors for the various elements of work at the time that the works are undertaken. By using these factors in the formula a percentage increase in the tendered value of work done is obtained and the amount resulting from this represents the CPA due to the Contractor (ERA, 2006). To address these problems, the MoWUD 1994 (amendment of MoI 2004), FIDIC 1999, MDB FIDIC 2006, PPA 2006 and PPPAA 2011 form of contracts provide an adjustment formula for price escalation.

2.9. Price Escalation Clauses

particular factor beyond the control of either party results in an increase or decrease in the Contractor's costs. It is also referred to as "Rise and Fall" which indicates that if the price of certain costs fall then the contract price will be adjusted in the client's favor. What goes up may also go down after all (David and Dirk, 2011).

A price escalation clause allows the parties an opportunity to plan for the uncertainty and allocate how and to what extent the additional costs will be absorbed. Another issue that usually walks hand in hand with price escalations (i.e. supply and demand) is material shortages. The contract should also contain a companion provision allowing for time extensions for material shortages. While many contracts allow for time extensions for unforeseeable circumstances that cause delay, depending on the circumstances, material shortages may be foreseeable (Gaudet, 2002).

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Table 2.2: Summary of Contract Forms

<i>No.</i>	<i>Conditions of contract</i>	<i>Description</i>
1	BATCoDA (1987) Clause 70	<i>Increase or decrease of costs</i>
		<ul style="list-style-type: none"> • The current market prices at the date of bid pricing (basic prices) shall be supported by bona-fide quotation from suppliers.
		<ul style="list-style-type: none"> • Only the net amount of the price difference between the base price and the current price at the time of the adjustment will be payable to the contractor.
2	MoWUD (1994) Clause 70	<i>Changes in Cost and Legislation</i>
		<ul style="list-style-type: none"> • Changes must be Act, Statute, Decree, Regulation and the like
		<ul style="list-style-type: none"> • Changes must be Act, Statute, Decree, Regulation and the lik
		<ul style="list-style-type: none"> • Net difference of costs shall be payable in addition to or deduction from the contract price
		<ul style="list-style-type: none"> • The contractor shall give written notice
		<ul style="list-style-type: none"> • The adjustments are calculated with reference to date of bid pricing
3	PPA (2006) Clause 47	<i>Price Adjustments</i>
		<ul style="list-style-type: none"> • Prices shall be adjusted only for fluctuations in of costs the input only if provided in the SCC.
		<ul style="list-style-type: none"> • These inputs have to be proposed and submitted by the contractor along his bid and is subjected to the approval of the engineer
		<ul style="list-style-type: none"> • It would be applied only if it is provided in the special conditions of contract
		<ul style="list-style-type: none"> • Provisional of each cost element (labor, materials, equipment usage, etc) are net of provisional sum
		<ul style="list-style-type: none"> • Price adjustment of cost elements are made in comparison of their current cost at the time of the adjustment with their prices at the date 28 days prior to the deadline for bid submission
		<ul style="list-style-type: none"> • The sources of indices shall be those listed in the contractor's bid and approval by the engineer
		<ul style="list-style-type: none"> • Price adjustment is recommended for contracts having completion time exceeding 18 months

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4	<i>FIDIC (2006) MDB Clause 13.8</i>	<i>Adjustment for Changes in cost</i>
		The formula is the same as that of the PPA, and the application is also similar to it except some additional clarifications as described below.
		If the contractors fails to complete the works within the time of completion, adjustment of price thereafter shall be made using either:
		<ul style="list-style-type: none"> • Each index or price applicable on the date 49 days prior to the expiry of the Time for Completion of the Works, or
		<ul style="list-style-type: none"> • The current index or price: whichever is more favorable to the employer the weightings (coefficients for each of the factors of cost stated in the table(s) so adjustment data shall only be adjusted if they have been rendered unreasonable, Unbalanced or inapplicable, as a result of Variations.
5	<i>PPPAA(2011) Clause 62</i>	<i>Price Adjustments</i>
		<ul style="list-style-type: none"> • Request for price adjustment in relation to a particular work items under this Contract may be filed by the Contractor after twelve (12) months from the effective date of the Contract where it is verified that the performance of the contract requires more than 18 months, which adjusted price takes effect as the new Contract Price in relation to that work item on the expiration of 30 days from the date on which the Public Body receives notification of that adjusted price from the Contractor, unless another date is agreed in writing between the Parties.
		<ul style="list-style-type: none"> • Price Adjustment shall be applicable as payable in full for the original scheduled completion period.
		<ul style="list-style-type: none"> • Unless specifically stated otherwise in the Contract, the basis for compensation will be only those categories of inputs, which are specifically listed as specified items in the SCC.
		<ul style="list-style-type: none"> • Contractor shall submit to the Public Body for review and approval all calculations and supporting information necessary to determine the price adjustment.
		<ul style="list-style-type: none"> • The fraction for each specified element and exact combination of elements that will be applied in the formula for price adjustment shall be determined in the SCC.

2.10. Effects of Price Escalation

The recent, extraordinary price increase has had multiple effects on the construction industry. The community of contractors and subcontractors has undoubtedly complained about declining or disappearing profit margins as well as huge project losses. In addition to lost fees, and damaged or destroyed construction businesses, the ripple effect of this dramatic price escalation has included numerous other impacts (ENR, 2004 and 2005).

Price changes may have an impact on owners, clients, and contractors as well as the project itself. If contractors are not adequately compensated, the main effects of price variation on them are cash flow (project financing) issues (Stukhart, 1982; Abdo, 2006; Asteway, 2008).

A. Delayed and Cancelled Projects

The escalation in material prices in the field of private development has been severe enough to prompt many developers to reconsider the "numbers" required to make a private development worthwhile. Delayed projects, reduced-in-scope projects, or cancelled projects have been the result. The same impact is being felt in the public construction sector.

For public projects that must be funded by bond issues, significant project price increases present special problems. In a number of projects, between the time a bond was approved by the voters and the time bids were received for construction projects, material prices increased significantly and bids came in at prices much beyond the approved contract amounts. Public bodies are then faced with the alternatives of putting projects on hold while supplemental funding is sought, canceling the project if additional money is not available, or attempting to scale-down the project scope (Van der Schans, 2005).

B. Reduced Numbers of Bidders

In part because of the current level of activity in the construction industry, but also in part because of escalation fears, owners are finding fewer bidders for their projects. States where asphalt supplies have been impacted are seeing fewer bidders for highway and paving projects. Owners are seeing more "one bidder" projects and an overall reduction in the number of bidders for projects (ENR, 2006).

C. Higher Project Costs

Those projects that have not been scrapped or significantly delayed as a result of price escalation difficulties have frequently experienced higher project costs. Contractor and supplier fears regarding potential, future price escalation, and the absence of price escalation clauses in most construction contracts, often leads to higher contract prices and larger project costs (Pearl, 1994).

D. Dispute Among Parties

Disputes are insidious often resulting in time overrun, cost escalation, litigation, and complete abandonment of projects (Sambasivan and Soon, 2007). Many construction disputes are arising out of disagreement and delay of hardship and expense during the construction project. Disputes in construction may be caused by one or a combination of several reasons. Most of the typical disputes are caused by factors such as unrealistic contract duration and costs, impact and ripple

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effects of delays, evaluation of the quality and quantity of works, differences in the interpretation of plans and specifications, unfulfilled duties, inefficiency and disruption (Groton, 1997).

The following effects of price escalation are identified and summarized as variables for use in survey.

- Delay
- Cancelled Projects
- Reduced Numbers of Bidders
- Higher Project Costs
- Cash flow (project financing) problem of the projects
- Dispute among parties

2.11. Problems of Price Escalation and Adjustment

Price escalation is one of the biggest issues in construction projects. The conventional price escalation study has been carried out by academics at universities and research institutes. The study results, including recommendations and new methods for better cost estimation are published in scholarly articles, books and journals. In some cases, the transport organizations or authorities employ academics and/or private consultants to study the price escalation of their projects (Priemus et. al., 2008).

Independent government auditors are in charge of ensuring the transparency, efficacy, and efficiency of public spending, according to Flyrbjerg and Bent (2005). They give recommendations to the Parliament on how to improve the use of the national budget. In some countries, government auditor provides detailed investigations to explain the causes of price escalation and study the frequency and magnitude of price escalation. Even though, the academics and the independent government auditors have the same main interest which is price escalation in transport projects.

Due to the ongoing and unforeseen changes in the macroeconomic climate, the construction sector has been confronted by an increase in build delivery costs that, in some circumstances, do not match the budgeted ones. Given such a situation, contractual clauses have been formulated to cater for optimum recovery of cost escalations. Subsequently, various increased cost adjustment methods have been developed and reviewed from time to time (Finsen, 2005).

Fixed price contracts were no longer suitable for such an economic environment since contractors were at risk with regard to recovery of profit due to cost escalation. Contracts were then subject to a cost-escalation provision in which a contractor was compensated for all increases in costs since the base date of tendering. Since then, several methods for cost recovery have been tried and these include traditional method and CPI based formulae. However each of these methods has shortcomings with regards to optimum cost recovery (Atkinson, 1992).

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Problems relating to construction price escalation include clients resist honoring the escalation clauses; escalation clauses do not adequately compensate increase in prices and uncompensated increase in cost of construction materials (Flyvbjerg et. al., 2004)

The contract price adjustment formula is a method of compensation or reimbursing for price fluctuation in labor costs, material prices, plant and equipment and fuel (De Vynck, 2002). CPAP stipulates that the purpose of the formula was to provide for the needs of contractors who required a clear-cut, agreed recovery formula method to avoid dissension and disputes with employers and subcontractors and provide a reasonable reimbursement of unusual price fluctuations.

This formula is based on the CPI by the Central Bureau of Statistics. The CPI number measures relative price changes from one time period to another. The problem with the CPI is that it may overestimate or under estimate the market conditions as at how prices have risen and selection of the most suitable index to use was the main problem in using inflation indices. When the formula is used, no attempt is made to calculate the actual amount of loss involved; consequently, the sums recoverable by the formula method will differ from these recoverable under traditional method and will be usually greater (Ramus et al., 2006).

Trickey (1983) contended that by relying on an incorrect index could give very misleading results. Since no audit of the amount of cost increase is done for each individual item, one would wonder whether clients pay the real losses incurred. CPAP clearly states that the formula cannot precisely reflect the actual cost fluctuations on any particular piece of work or contract.

De Vynck (2002) noted that the proportions and indices applied are indicative of average price movements and do not represent any particular contract. In low inflation environment, CPI formulae may operate satisfactory.

The following problems in price escalation and adjustment are identified and summarized as variables:

- Clients resist honoring the escalation clauses
- Escalation clauses do not adequately compensate increase in prices
- Uncompensated increase in cost of construction materials
- Construction Price Indices may overestimate or under estimate the market conditions as
 - at how prices have risen
- Selection of the most suitable index in using inflation indice

2.12. Managing Price Escalation

Understanding the factors that contribute to escalation on construction projects is crucial before measuring or managing it. This is especially critical in the current situation, where price

fluctuations have been so volatile that it has been difficult to predict or estimate what bid prices might actually be (Peter and William, 2006).

As can be seen, cost escalation in the construction market is a cumulative effect of a number of different factors. Many of the strategies will demand new ways of approaching construction design and procurement, and a redistribution of the risk allocation in projects.

A. Recognition

The first step is to recognize that escalation is a real threat to construction programs and projects, and to acknowledge its existence. There is still a high degree of wishful thinking in project budgeting, hoping that escalation is not going to remain high. Project owners must first:

- Recognize the reality of the bid market
- Recognize the reality of the bid volatility: Material prices will continue to fluctuate, although perhaps not to the extent seen in recent years.

B. Cost Risk Allocation

Poor risk allocation is the main escalator in the current market. The majority of the risk is distributed through traditional bidding processes to those who are least able to withstand cost swings. Project owners need to alter the way they approach and think about their projects if they want to control cost escalation and lessen the effects of future cost rises or other factors that will undoubtedly emerge to put extra pressure on the market. Perhaps the most important thing project owners can do to minimize the impact of the volatile construction market is to become partners in the risk. This takes the burden of handling market volatility off the back of the contractors and vendors and in turn reduces the pressure for bidders to charge premiums (Peter and William, 2006).

The first step is for project owners to take more responsibility for the risk associated with material price fluctuations. Because the owner is much more diversified, they are better able to handle the risk. This can be done in a number of ways at each level of the design and build process. To help absorb the risk for the contractors, project owners can:

- Use fluctuation clauses to account for changes in material costs; in other words, the owner agrees to cover the cost of materials and does not require the contractor to submit a fixed price for something they may not be able to purchase for quite some time.
- Pre-purchase materials and suppliers' partnership to limit the impact of future price fluctuations
- Provide dedicated float for schedule slippage by understanding that, due to the current market and transient material shortages, some scheduling delays may be inevitable.
- Reduce the bid award period to accommodate shorter price locks.

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- Negotiate subcontracts along with the contractors.
- Use Cost-Plus contracts.
- Consider locally available materials in design.

To help absorb the risk for the architects and engineers, project owners can:

- Limit the redesign clause. This has some far reaching consequences, in that owners must be willing to take more responsibility for the final design and not count on redesign to catch changes in scope.

At the program level, project owners can:

- Develop program-wide contingencies and risk management protocols. This requires first recognizing the types of risk that exist and then ensuring that all members of the project team understand and are trained on how to deal with them.

At all levels of the project, the important thing for the project owner to do is to actively manage design and cost, by ensuring that all participants in the design process are fully aware of budgetary constraints as well as the impact of any changes or delays on overall project cost (Atkeson et.al., 2001).

The following are methods/tools to manage/administer price escalation identified and summarized as variables for use in survey:

- Consider fluctuation/escalation clauses
- Bulk material purchases and suppliers partnerships
- Use Cost-Plus contracts
- Develop program-wide contingencies and risk management protocols
- Regular cost monitoring throughout the project
- Consider locally available material in design

2.13 Causes of Cost inflation at Tender stage

According to Angelo and Reina (2002), cost increase or inflation is a major problem in both developed and developing countries. In Ethiopia, according to Ethiopian statistics service (CPI-NOV-2021), The November 2021 Country Level Consumer Price Index has increased by 33.0 percent as compared to November 2020. Construction materials, water, fuel and power increased by 18.5 percent.

The causes of cost inflation in construction projects are different. Some are not only hard to predict but also difficult to manage (Morris and Hough, 1999). The most significant causes of cost overruns, according to a study conducted in Turkey by Arditi, et al. (1985), were

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inflationary pressures, increases in material prices and laborers' wages, difficulties obtaining construction materials, construction delays, flaws in cost estimates prepared by public agencies, and unexpected sub-soil conditions.

According to a 2011 study on cost increases in the construction industry done in Mozambique, it is widely acknowledged that the tender documentation given in this business is frequently inaccurate and difficult to understand. The Consultants interviewed largely agreed with this criticism and sight the absence of clear requirements in the terms of reference for Consultancy proposals for design in the road sector.

Poor pre-tender services can also result in claims for delay, longer haul lengths, and frequently redesign because there are no defined, tested, and measured material sources. The resulting tender documents effectively pass the risk factors inherent in a project where insufficient pre tender investigation has been done onto the bidders and this risk is inevitably transformed into increased prices.

According to interview of contractors in Mozambique, delays in procurement and payment, inadequate pre tender investigations and resulting inaccurate tender documentation as the prime cause of increases in costs and high assessment of risk.

Factors influencing construction time and cost inflation for high-rise projects in Indonesia, and major factors influencing the cost according to Kaming, et al, (1997) were material cost increase due to inflation, inaccurate material estimating and the degree of project complexity.

Simply said, Mansfield, et. Al. (1994), reiterated that cost inflation is attributed to problems in finance and payment arrangements, poor contract management, material shortages, changes in site conditions, design changes, mistakes and discrepancies in contract documents, mistakes during constructions, price fluctuations, inaccurate estimating, delays, additional work, shortening of contract periods, and fraudulent practices and kickbacks. According to Robert F. Cox, (2007), project owners identified five reasons for project cost escalation: these reasons were, incomplete drawings, poor pre-planning process, escalating cost of materials, lack of timely decisions and excessive change orders.

The following are the factors that change the cost of the construction projects through time according to Project Management User's Guide, (2005): poor project management, design changes, unexpected ground conditions, inflation, shortages of materials, change in exchange rates, inappropriate contractors, funding problems and force majeure.

CHAPTER THREE

3. The Research Design and Methodology

3.1 The Study Approach

The technique used in this study began with problem identification, which was accomplished by an unstructured literature review, archival research, and informal consultations with peers and industry experts. Following problem identification, the research design was created. Then the data and information sources were chosen in accordance with the developed research design. The research tools were chosen based on the data and information sources and available documentary sources that were relevant to the study were examined.

A questionnaire was created and given to contractors, consultants, and employers following a thorough analysis of the literature and desk study in order to acquire their professional judgment based on their experience. Upon obtaining the desired data, checking and sorting of data has been done. The data were then analyzed for cross-checking the validity and conformity of the information obtained through the overall research work. This was followed by thorough discussions in order to draw a conclusion and to forward recommendations based on the findings of the study.

3.2 The Research Type

A descriptive and exploratory survey design was used in this study. The goal was to gather information from the relevant population to assess how different stakeholders saw the challenges of price escalation, ranking of project price escalation variables, its consequences, and the current practice of price escalation administration/management in Addis Ababa design and construction works bureau.

3.3 Data Source and collection

3.3.1 Primary data

The main primary data sources are: questionnaires, interview, & others those collected from the sources directly.

3.3.2 Secondary data

The main secondary data sources are like: written material& other those are not directly obtained from the source.

3.3.3. Population and Participants

The population of the study is building construction projects in Addis Ababa design and construction works bureau whose constructions were started after July 2017 and their construction progress was more than 50% completed accordingly (N projects) were identified and its participants under Addis Ababa City building sector. The basis of selecting this particular time was based on the information and document availability as well as price escalation was occurred more recently.

3.3.4. Sampling Technique

The study uses simple random sampling techniques to select employees and managerial to collect the necessary information. Simple random sampling is the form of respondent's selection. Which done randomly from the concerned project professional for avoiding bias. As Aftab Memon (Memon., A., H. 2014), explains simple random sampling is a probability sampling technique in which a random selection is made of the first element for sample and the subsequent sample size reached in the study. The data will be collected from the project owner, contractors and consultants using the designed methods of data collection technique. The sample size can be calculated using the following equation:

$$n = \frac{n^1}{1 + \frac{n^1}{N}} \dots\dots\dots\text{equation 3.1}$$

$$n^1 = \frac{S^2}{E^2} \dots\dots\dots\text{equation 3.2}$$

$$S^2 = p(1 - p) \dots\dots\dots\text{equation 3.3}$$

Where:

N- Total population =126

n = sample size from finite population,

n' = sample size from infinite population,

S2 = the variance of the population elements.

P = Proportion of the population elements that belong to the defined category,

E= Standard error of the sampling distribution

Assumptions:

- Confidence level = 95%
- Population proportion (P) = 0.5
- Margin of error (E) = ±5% = ±0.05

Hence solving for n'

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$$s^2 = P(1-p) = 0.5(0.5) = 0.25$$

$$E^2 = 0.05^2 = 0.0025$$

$$n' = s^2 / E^2 = 100$$

$$n = 55.87 = 56$$

$$n = \frac{n^2}{1 + \frac{n^2}{N}}$$

3.4 Study Area

The study area is located in City Government of Addis Ababa Design and construction bureau.

3.5. Data Analysis

The procedure used in analyzing of data was aimed at establishing the relative importance of the various factors that causing price escalation, its effect, problems of price escalation adjustment and managing/administering price escalation of Addis Ababa design and construction works bureau.

There are three steps in analyzing the data:

- Calculating RII
- Ranking of each factors based on RII
- Determining degree of correlations in ranking the variables among Clients, Consultants and Contractors.

In the analysis, the “Relative Importance Index” methods were adopted to determine the ranking relative importance of variables for Addis Ababa design and construction works bureau. The method was adopted in this study within various groups of respondents (Clients, Consultants and Contractors). The five point scale (0, 1, 2, 3, and 4) was used to calculate the relative importance index for each variable which was then used to determine the relative ranking.

3.5.1. Questionnaire Analysis

The data collected through questionnaire were analyzed through percentage method for question number two in part one, average score method for question number three and four in part one and part two, part three, part five, and part six question was analyzed through relative importance index. The five ordinal measure of agreement of Likert scale represent the following rating:

Ordinal scale used for the measurement of rate of occurrence for factors causing price escalation:

Table 3.1: Rating scale for factors causing price escalation

Item	Never	Seldom	Sometimes	Often	Always
Scale	0	1	2	3	4

Ordinal scale used for the measurement of the degree of significances for effects of price escalation on the construction projects:

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Table 3.2: Rating scale for effects of price escalation

Item	No significance	Minor significance	Average significance	High significance	Extreme significance
Scale	0	1	2	3	4

Ordinal scale used for the measurement of the occurrences of price escalation adjustment problems on the construction projects:

Table 3.3: Rating scale for price escalation and adjustment problems

Item	Never	Sometimes	Usually	Frequently	Most Frequently
Scale	0	1	2	3	4

Ordinal scale used for the measurement of the degree of importance of methods to manage/administer price escalation on the construction projects:

Table 3.4: Rating scale for methods to manage/administer price escalation

Item	Unimportant	Less important	Important	Very important
Scale	0	1	2	3

The relative importance index is computed as (Cheung et al, 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007):

Relative importance index, $RII = \sum w / (A * N)$equation 3.4

Where:

W is the weight assigned to each factor by the respondents (ranging from 0 to 4)

A is the highest weight (i.e. 4 in this case)

N is the total number of respondents (56 in this case)

The value of relative importance index had range from 0 to 1, where 1 is extremely important and 0 is unimportant.

Spearman's Rank Correlation Coefficient method, which number varies between -1 and +1, was used to know owners, consultants and contractors perceptions of factors causing price escalation, its effect, price escalation adjustment problems and methods to manage/administer price escalation on federal road construction projects.

As spearman's rank correlation (rs) is a technique to test the direction and strength of the relationship between two variables, the method was adopted in this study to show the degree of agreement between the respondents. It is calculated using the following formula:

$r_s = 1 - (6 \sum d^2 / n(n^2 - 1))$equation 3.5

Where:

r_s is Spearman's Rank Correlation Coefficient,

d is the difference in the factors ranks given by the respondents and

n is the number of data pairs.

- A correlation coefficient of **+1** means perfect positive correlation (agreement).
- A correlation coefficient close to **0** means no correlation.
- A correlation coefficient of **-1** means perfect negative correlation (disagreement).

CHAPTER FOUR

4. ANALYSIS OF FINDINGS AND DISCUSSIONS

4.1. Introduction

This part of the research deals with the analysis and discussion of the data gathered from the questionnaire survey. It includes the assessment of the causes and effects of price escalation and methods to manage or administer price escalation in Addis Ababa Design and Construction Works Bureau (AADCB).

4.2. Questionnaires Finding and Discussion

A self-administered 61 questionnaires were sent to individuals/organizations in the sample space to investigate price escalation for Addis Ababa Design and Construction Works Bureau (AADCB). Among those 56 was answered by respondents. Respondents were presented with a range of questions designed to identify factors causing price escalation and effects of price escalation.

4.2.1. Respondent's Profile

Sample description deals with several important issues closely connected with the purpose of current research. It helps to forecast general validity and reliability of data collected from the respondents. The data contains responses of highly experienced participants which work in companies of different size and operate in different parts of the country and moreover all the respondents deal with road construction projects might be able to provide relevant data in order to answer research questions.

The respondents profile includes respondent's type or origin in the organization, Experience on construction projects and number of construction projects executed in Addis Ababa Design and Construction Works Bureau (AADCB). Small numbers of questionnaires were distributed for Clients (only 15 questionnaires) because for Addis Ababa Design and Construction Works Bureau (AADCB). Therefore it can be concludes that the 15 questionnaires may represent the client's perception towards this research questions. While Contractors and Consultants takes equal numbers of questionnaires (each 23 questionnaires) because each sample project contains one Contractor and one consultant and equal proportion of those respondent's make the sample unbiased.

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Table 4.1: Questionnaire distribution

S.N	Participants	Distributed	No. of response	Percent	Cumulative	Response rate (%)
1	Clients	15	14	24.6	24.60%	93%
2	Contractors	23	22	37.7	62.70%	96%
3	Consultants	23	20	37.7	100%	87%
	Total	61	56	100		92%

Source: Own source, 2023

The overall response rate for the survey was 56 (92%). The response rate in the survey was 20 (87%) for Consultants, 22 (96%) for Contractors and 14 (93%) for clients. Table 4.1, Shows that among 56 questionnaire respondent's 20 (37.7%) were Consultants, 22 (37.7%) Contractors and 14 (24.6) Clients, Therefore most of the respondents were contractors.

4.2.2. Experience of Respondents

Table 4.2 shows that 37.5% (21) of the respondents firm have experience less than 5 years at construction works, 26.79% (15) of respondents have experience between 5 to 10 years, 117.86% (10) of respondents have experience from 10 to 15 years and 17.86% (10) have experience more than fifteen years.

Table 4.2: Experience of respondents (years)

Experience(yrs.)	Client		Consultant		Contractor		Total	
	No.	%	No.	%	No.	%	No.	%
Less than 5	5	33.3	6	30	10	45	21	37.50
5-10	4	26.7	6	30	5	23	15	26.79
11-15	3	20	5	25	2	9	10	17.86
Greater than 15	2	13.3	3	15	5	23	10	17.86
Total							56	100

Source: Own source, 2023

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Table 4.3 shows that for this study 28% (28.57) of the respondents they execute less than 5 construction projects, 36% (35.71) of the respondents they execute between 5-10 projects and the same percentage of respondents they execute more than 10 projects.

Table 4.3: Experience of respondents on number of projects executed

Experience(projects)	Client		Consultant		Contractor		Total	
	No.	%	No.	%	No.	%	No.	%
Less than 5	5	33.3	5	25	6	27.27	16	28.57
10-May	5	33.3	6	30	9	40.91	20	35.71
15	4	26.7	9	45	7	31.82	20	35.71
Total							56	100.00

Source: Own source, 2023

4.2.3. Factors Causing Price Escalation

This section deals with the analysis of the information gathered from the questionnaire survey including identification of rate of occurrences of factors causing price escalation. The factors were grouped into two groups; these groups are internal causes and external causes. Lists of factors causing price escalation were presented to the respondents to score them according to the rate of occurrence on the scale of 0 to 4. Here under each individual factors causing price escalation Relative Importance Index (RII) perceived by all respondents was computed for over all analysis.

From the ranking assigned to each factors causing price escalation, the most important ones contributing to the causes of price escalation for the case of Addis Ababa design and construction works bureau.

4.2.3.1. Internal Causes of Price Escalation

This part of the questionnaire is intended to identify first the respondent's perspective towards the internal causes of price escalation. The table below (Table 4.4) shows, arithmetical ranks of internal factors causing price escalation for which were ranked by the respondent's (Clients, Consultants and Contractors).

The statistical analyses of internal factors causing price escalation for Addis Ababa design and construction works bureau construction projects have been done using their relative importance index and the correlations between the respondents in ranking the factors have been calculated.

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The table below (Table 4.4) the statistical results of respondents in ranking internal factors causing price escalation and relative importance index with their respective rank has been indicated.

Table 4.4: The results of internal factors causing price escalation

Internal factors causing price escalation	Client		Contractor		Consultant		Combined	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Poor estimating	0.66	1	0.66	1	0.59	4	0.64	1
Improper planning and/or improper implementation of proper planning	0.58	3	0.56	4	0.7	1	0.62	2
Project schedule changes	0.61	2	0.6	3	0.64	2	0.62	2
Engineering and construction complexities	0.52	4	0.45	6	0.6	3	0.52	4
Ambiguous contract provisions	0.43	5	0.61	2	0.43	7	0.49	5
Delivery/procurement approach	0.34	6	0.53	5	0.49	5	0.45	6
Inconsistent application of contingencies	0.36	7	0.39	7	0.49	5	0.41	7

Source: Own source, 2023

As we can see from the combined result shown on Table 4.2, the major internal factor causing price escalation which have been occur on the projects are poor estimating with a RII of 0.64 respectively. This result is identical in terms of order with the clients and contractors, which reflect the importance of this factor.

Construction cost estimate is complex. Comprehensive exercise based on detailed and accurate information is required to achieve reliable levels of comfort. Accurate estimates of project costs provide an essential part of the proper basis for management decisions and control. This result is in line with the results of Hester et al. (1991). More accurate estimations shall enable contractors to produce more reliable cash flow forecasts, which is one of the main factors affecting the overall success of a construction project. Furthermore, owners shall also produce better predictions for the budget allocations of their projects. It is convenience that the owners’ primary goal is estimating project cost should be to ensure that the estimating methods will lead to finish the project within budget. The estimation of time and required resource is very critical and important risk. Therefore, proper estimating of the project is crucial to the construction industry.

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Improper planning and/or improper implementation of proper planning and project schedule changes pointed out as the second important internal causes of price escalation with RII value of 0.62. Proper planning with respect to client organization during feasibility study preparation of alternatives for achieving specified objectives successfully in terms of time and cost, and with respect to contractor's organization during implementation phase of a project reasonable work planning (activity + allocated time) and strategies used in accomplishing the project within planned time and cost has been identified as significant impact on the success of a project. Like this study result Flyvbjerg et al. (2002) and Molenaar (2005) study finding also showed that proper planning as a leading significant factor. Planning and scheduling are continuing processes during construction and match with the resources and time to develop the work to minimize price escalation and disputes.

While inconsistent application of contingencies place the last rank with RII value of 0.41 and delivery/procurement approach ranked as the second one from the last with RII value of 0.45. However, contingency budgeting is done in order to provide funds for minor change orders, without forcing the client to request additional funds or reallocate funds from other projects. A contingency amount can be planned for and budgeted at project award.

The agreements between the respondents (i.e. between client-consultant, client-contractors and contractors-consultants) in ranking the internal factors have been calculated through spearman's rank correlation coefficient. The Spearman's rank correlation coefficient in the table below (Table 4.5) shows that relatively there is a moderate positive agreement between Contractors-Consultants, weak negative agreement among Clients-Contractors and no agreement between Clients-Consultants in ranking internal factors causing price escalation of Addis Ababa design and construction works bureau. The moderate relationship between contractors and consultants indicates that they have moderately similar response rank on some internal cause of price escalation.

The reason for the negative and weak agreement between clients and contractors is that their response on ranking of internal causes of price escalation. One of the reason could be resentment as a result of miscommunication that exists between the clients and contractors.

The reason for no correlation between clients and consultants is that their opposite response on the frequency (rank) of the occurrence of the internal causes of price escalation. This could be due to the difference in exposure and the general feeling to the threats of causes of price escalation between clients and consultants in construction projects.

Table 4.5: Correlations among respondents in ranking internal factors causing price escalation

	Spearman's rank correlation coefficient (r's)		
Respondents	Clients	Consultants	Contractors
Clients	1	0	-0.15
Consultants	0	1	0.6

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Contractors	-0.15	0.6	1
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Source: Own source, 2023

4.2.3.2. External Causes of Price Escalation

A total of nine (8) external factors causing price escalation of a project were identified under this category. These factors were ranked based on its relative importance index assigned by the respondents (Table 4.6). The table below shows external causes of price escalation, its relative importance index and their ranks between respondents of clients, contractors and consultants. The statistical analyses of external causes of price escalation in construction projects have been done using their relative importance index and agreements between respondents in ranking the external causes has been done through spearman’s correlation coefficient.

Table 4.6 shows the results of relative importance index of the external factors causing price escalation. Based on statistical result increase in material cost (material price fluctuation) is very critical for the causes of price escalation of a project with relatively high relative importance index of 0.89 which indicates the high importance of materials in the project. Increase in material cost (material price fluctuation) is one of the clearest factors that cause price escalation of the project. This result coincide with result of ACAF (2008) that increase in material cost (material price fluctuation) is one of the important causes of price escalation.

The fluctuation in the cost of construction materials is associated with the location of project country, the economic level, and the volume of required materials. The result of this factor differs from country to country. In Ethiopia the markets are limited, increases the problems of materials.

From table 4.6, it can observe that fluctuation in money exchange rate is ranked by both clients itself and consultants as secondary influential factors for price escalation of a project. This confirmed that since the exchange rate has been deregulated, the prices of all materials and services have been increasing. Foreign exchange rate volatility may also impact on global trade patterns and thus affect a country’s balance of payments position.

While local or municipal regulations ranked as a least external causes of price escalation with relative importance index of 0.37. In ranking this cause there is a perfect agreement between consultants and contractors (Table 4.6).

Table 4.6: The result of external factors causing price escalation

External factors causing escalation	Client		Contractor		Consultant		Combined	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Increase in material cost (material price fluctuation)	0.91	1	0.89	1	0.88	1	0.89	1

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Fluctuation in money exchange rates	0.89	2	0.78	2	0.7	2	0.79	2
Limited capacity of material producers	0.68	3	0.69	3	0.6	3	0.66	3
Shortage of labors / skilled workers	0.52	5	0.65	4	0.46	6	0.54	4
Change in Legislation	0.63	4	0.49	6	0.5	4	0.54	5
Force Majeure	0.46	7	0.55	5	0.5	4	0.5	6
Local concerns and requirements	0.52	5	0.41	7	0.45	7	0.46	7
Local or municipal regulations	0.45	8	0.26	8	0.41	8	0.37	8

Source: Own source, 2023

The agreements between the respondents (i.e. between client-consultant, client-contractors and contractors-consultants) in ranking the external factors have been calculated through spearman's rank correlation coefficient.

Table 4.7: Correlations among respondents in ranking external factors causing price escalation

	Spearman's rank correlation coefficient (r's)		
Respondents	Clients	Consultants	Contractors
Clients	1	+0.38	+0.22
Consultants	+0.38	1	+0.94
Contractors	+0.22	+0.94	1

Source: Own source, 2023

The Spearman's rank correlation coefficient in the above table (Table 4.7) shows that relatively there is a very strong positive agreement between Contractors-Consultants and weak positive agreements between Clients-Contractors and among Clients-consultants in ranking external factors causing price escalation on Addis Ababa design and construction works bureau. The strong correlation between consultants and contractors indicates that they have the same attitude and perception towards the external causes of price escalation.

The weak correlation of contractors to clients and consultants implies that contractors have too different attitudes with the owners and consultants. The contractor was the mainly challenged party due to the occurrence of the cause of price escalation.

4.2.4. Effects of Price Escalation

The degree of effects of price escalation varies on the stakeholders in the construction industry; all the parties involved are affected by price escalation. The first victim of price escalation would

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be the project owner since he has envisaged his construction project to be realized within an allocated cost and time frame.

Price escalation does not affect only those parties that are involved directly in the construction of a project, but its effects pass to the construction industry as a whole and consequently to the national economy of the country.

A section of the questionnaire containing potential effects identified from literature was presented to respondents. Respondents were requested to indicate the most recurrent effects of price escalation from the listed potential effects on a 5-point Likert's scale as ranked from 0-4 (when 4 represents extreme significant effects while 0 is less significant), based on their experience to evaluate the frequencies of the effects in Addis Ababa design and construction works bureau.

From each of these responses to identify the consequential effects of price escalation, results were analyzed in order to identify the major ones among the potential effects. The result of this analysis based on their relative importance index of the parties involved in the survey. The statistical analyses of project effects of price escalation on Addis Ababa design and construction works bureau have been done using their relative importance index and the correlations between the respondents in ranking the effects have been calculated.

From the ranking assigned to each effect, the most important effects of price escalation on Addis Ababa design and construction works bureau were able to be identified. The table below (Table 4.8) shows, arithmetical rank of effects which were ranked by the respondent's (Clients, Consultants and Contractors). The rank was based on the value of relative importance index assigned to effects.

Table 4.8: The result of effects of price escalation

Effects of price escalation	Client		Contractor		Consultant		Combined	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Higher Project Costs	0.89	1	0.88	1	0.85	1	0.87	1
Cash flow (project financing) problem of the projects	0.77	2	0.84	2	0.7	3	0.77	2
Delay	0.73	3	0.77	3	0.71	2	0.74	3
Dispute among parties	0.71	4	0.57	4	0.64	4	0.64	4
Reduced Numbers of Bidders	0.55	6	0.47	5	0.48	5	0.5	5
Cancelled Projects	0.61	5	0.28	6	0.38	6	0.42	6

Source: Own source, 2023

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Based on the result of statistical analysis through relative importance index, higher project costs, cash flow (project financing) problem of the projects, delay, dispute among parties, reduced numbers of bidders and cancelled projects are listed from high to low according to their degree of importance respectively.

The result of statistical analyses in figure above indicated that a higher project cost takes the highest rank with RII value of 0.87. Excessive cost escalation requires additional budget, this in turn eat up the scarce financial resources of the country, which lead to further budget short fall for construction projects. This prevents the planned increase in property and service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth.

Cash flow (project financing) problem of the projects which means the contractor's cash flow (cash in and cash out) pointed out as the second important effects with RII value of 0.77. This indicates the high importance of cash for the progress of project. Any shortage of cash for the contractor will cause many problems such as slow progress and work decline in productivity. Also the contractors will not be able to purchase the needed equipment and materials for work. Delay places the third rank with RII value of 0.71. This result is identical in terms of order with the clients and contractors, which reflects the importance of this effect. One of the common effects of price escalation is delay; this in turn affects clients and contractors. In case of delay, the cost of required materials or equipment may increase, or these goods may run out from the local markets, then the price escalations may occur. Furthermore, lengthy delays increase cost escalations tremendously.

From table 4.8, it can observe that dispute among parties is ranked by clients, consultants and contractors as the fourth one with the same RII value of 0.64. Large scale projects usually involved very complex phasing planning and designing, financing and legal aspects. Overlapping and interrelation between the parties involved usually occurred. Thus, this resulted in an increasing number of disputes and related costs between the main contractor and the project owner.

Price escalation will also be a source of dispute among stakeholders and it will lead to adversarial relationship among project participants. To solve these disputes, it takes additional time that affects the project schedule and hence affects the total duration of the project. To the industry as a whole, price escalations could bring about a drop in construction activities, bad reputation, and inability to secure project finance easily from public authorities in the future. All these effects undermine the capability and sustainability of the construction industry.

The agreements between the respondents (i.e. between client-consultant, client-contractors and contractors-consultants) in ranking the effects have been calculated through spearman's rank correlation coefficient.

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The Spearman's rank correlation coefficient in the table below (Table 4.9) shows that relatively there is a very strong positive agreement between Consultants-Contractors and weak negative agreements between Clients-Contractors and among Clients-consultants in ranking effects of price escalation on Addis Ababa design and construction works bureau. The reason for weak and negative correlation may be due to resulting effects, which are directly related with who is affected.

Table 4.9: Correlations among respondents in ranking effects of price escalation

	Spearman's rank correlation coefficient (r's)		
Respondents	Clients	Consultants	Contractors
Clients	1	-0.28	-0.31
Consultants	-0.28	1	+0.9
Contractors	-0.31	+0.9	1

Source: Own source, 2023

4.2.5. Methods of Price Adjustment

There are two methods of price adjustments; proven (base price) and indices (formula) normally used in the domestic construction industry. Previous projects using proven/base price adjustment methods. Sub-clause 47.1 of PPA 2006, Sub-clause 13.8 of FIDIC 1999 and FIDIC 2006 MDB and clause 62 of PPPAA 2011 edition provide price indices/formula method for adjustment.

Among the respondents 7%, 15% and 14% of clients, consultants and contractors believe the use of proven/base price adjustment method is better. The majority of clients, consultants and contractors (93%, 85% and 86%) respond in favor of price indices/formula method of adjustment.

4.2.6. Price Escalation Compensation System

In Ethiopia, construction projects are governed by the standard conditions of contract by MoWUD 1994 (amendment of 2004), PPA of the ministry of finance and economic development standard bidding document for the procurement of works issued in January 2006, FIDIC IV, FIDIC 1999 and MDB FIDIC 2006. And these conditions of contracts contain provisions that clearly give way to compensate price escalations that occur on due course of construction projects.

4.2.6.1. Provisions in Conditions of Contract

International contract forms especially FIDIC has been intensively used for the last two decades on major infrastructure projects such as road projects. The survey tried to show the usage of contract forms in the federal road construction projects in relation to different FIDIC editions. For this purpose, three subsequent editions (FIDIC IV, FIDIC 1999 and FIDIC 2006 MDB) were forwarded with MoWUD 1994 and PPA 2006 which are currently applicable locally.

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The Ethiopian standard conditions of contract, MoWUD 1994, has a special category of condition which says "changes in cost and legislation" and described in clause 70 and it is dealt in detail in section 2.10.1. It should be noted that for any compensation to be made, the changes in cost of inputs must be changed by legislative bodies. On the other hand, the Ethiopian economy is led by free market economy policy in which market prices are not centrally governed. Market prices are mostly governed by the direct costs, demand and supply relation. The standard conditions of contract for construction projects by public procurement agency, PPA 2006 provides another clause for price adjustment. In sub clause 47.1 of this document it says: "price shall be adjusted for fluctuations in the cost of inputs only if provided in the special conditions of contract". Here it can be seen that the provision is open to entertain cost changes regardless of the absence of any act, statute, decree, regulation or the like.

Among the respondents, the Harmonized MDB FIDIC 2006 has been the most dominating general condition. The PPA 2006 is the next condition of contract mostly used in the Addis Ababa design and construction works bureau. The difference between the ICB and NCB version of PPA 2006 shows that, Z_o/Z_n (adjustment coefficient) included in sub clause 47.2 of ICB while it is omitted in the NCB version.

4.2.7. Price Escalation Administration System

According to the respondents 36%, 20% and 14% of clients, consultants and contractors respectively rated the current price escalation administration system (practice) in federal road construction projects as very good. It is rated good by 50%, 35% and 36% of clients, consultants, contractors respectively. 14% of clients, 25% of consultants and 36% of contractors believe current price escalation administration system (practice) in Addis Ababa design and construction works bureau rating it satisfactory. It is rated poor by few contractors (14%) and 20% of consultants respectively.

4.2.8. Problems of Price Escalation and Adjustment

There are five price escalation and adjustment problems of the project in the bureau were identified and ranked from the view of clients, consultants and contractors. Table 4.10 shows the results of relative importance index and the ranking of price escalation adjustment problems between respondents of client, contractor and consultant.

Table 4.10: The result of price escalation and adjustment problems

Price escalation adjustment	Client		Consultant		Consultant		Combined	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Uncompensated increase in cost of construction materials	0.43	3	0.65	1	0.6	1	0.56	1

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Construction Price Indices may overestimate or under estimate the market conditions as at how prices have risen	0.61	1	0.48	4	0.56	4	0.55	2
Selection of the most suitable index in using inflation indices	0.55	2	0.45	5	0.58	3	0.53	3
Escalation clauses do not adequately compensate increase in prices	0.3	4	0.59	2	0.59	2	0.49	4
Clients resist honoring the escalation clauses	0.09	5	0.57	3	0.43	5	0.36	5

Source: Own source, 2023

Table 4.10 shows the result of survey analysis of price escalation adjustment problems. The statistical analysis of price escalation adjustment problems of construction projects has been done using their relative importance index.

Based on result of analysis uncompensated increase in cost of construction materials, construction Price Indices may overestimate or under estimate the market conditions as at how prices have risen, selection of the most suitable index in using inflation indices, escalation clauses do not adequately compensate increase in prices and clients resist honoring the escalation clauses and ranked on their degree of importance respectively.

Based on the combined relative important index and rank as shown on table 4.10, the important and top ranked problems of price escalation adjustment are discussed below.

Uncompensated increase in cost of construction materials with a relative importance index of 0.56 became the main important problems of price escalation adjustment. This is because of escalation of material prices are affects the liquidity of projects and cost performance of projects. The cost of construction materials are increases from time to time because of a limited suppliers, factories, shortage of raw materials and cost of transportation from foreign countries.

Construction price indices may overestimate or under estimate the market conditions as at how prices have risen and selection of the most suitable index in using inflation indices with RII value of 0.55 and 0.53 became the important problems next to uncompensated increase in cost of construction materials. The greatest difficulty of dealing with inflationary effects in economic appraisals is being able to arrive at realistic measures of current inflation and being able to forecast what it is likely to be over the study period for the proposal. The difficulties are compounded by the fact that not all goods increase or decrease in price by a similar amount and certainly not simultaneously. Inflation rates can change very quickly. Some of these difficulties can be overcome by the use of general indices compiled from data collected by statisticians. Many of these major indices emanate from government departments.

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Table 4.10 shows that the respondents, consultants ranked escalation clauses do not adequately compensate increase in prices with RII value of 0.59 as the second important problem of price adjustment. This result is in full conformity with the respondent contractors, but in the case of clients, the value of the importance index is (0.3) slower than consultants and contractors, which means that consultants and contractors are more technically aware of these elements and give them greater priority than others.

The agreements between the respondents (i.e. between client-consultant, client-contractors and contractors-consultants) in ranking the problems have been calculated through spearman's rank correlation coefficient.

Table 4.11: Correlations among respondents in ranking problems of price escalation adjustment

	Spearman's rank correlation coefficient (r's)		
Respondents	Clients	Consultants	Contractors
Clients	1	-0.9	-0.7
Consultants	-0.9	1	+0.6
Contractors	-0.7	+0.6	1

Source: Own source, 2023

The Spearman's rank correlation coefficient in the above table (Table 4.11) shows that relatively there is a moderate negative agreement between Clients-Contractors, very strong negative agreement among Clients-Consultants and moderate positive agreements between Consultants-Contractors in ranking problems of price escalation adjustment on Addis Ababa design and construction works bureau.

There is a strong disagreement between clients and consultants, contractors and clients. The possible reasons could be adversarial relationship and hostility as a result of miscommunication and the general feeling of apprehension that exists between the parties.

4.2.9. Methods to Manage/Administer Price Escalation

The statistical analyses of methods to manage/administer price escalation in construction projects have been done using their relative importance index and agreements between respondents in ranking the methods has been done through spearman's correlation coefficient.

Table 4.12 shows the results of relative importance index of the Methods to manage/administer price escalation. Based on statistical result consider fluctuation/escalation clauses is very significant for the price escalation management/administration of a project with relatively high relative importance index of 0.82. From table 4.12, it can observed that consider fluctuation/escalation clauses is ranked by both contractors itself and consultants as a primary methods for the price escalation management/administration. While Use Cost-Plus contracts

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ranked as a least methods with relative importance index of 0.46. In ranking this factor there is a perfect agreement between clients and consultants (Table 4.12).

Table 4.12: The result of methods to manage/administer price escalation

Methods to manage/administer	Client		Contractor		Consultant		Combined	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Consider fluctuation/escalation clauses	0.77	2	0.91	1	0.79	1	0.82	1
Consider locally available material in design	0.79	1	0.72	3	0.6	2	0.7	2
Regular cost monitoring throughout the project	0.79	1	0.73	2	0.59	3	0.70	2
Develop program-wide contingencies and risk management protocols	0.66	3	0.7	3	0.48	5	0.60	3
Bulk material purchases and suppliers partnerships	0.57	4	0.66	4	0.56	4	0.60	4
Use Cost-Plus contracts	0.41	5	0.55	5	0.43	6	0.46	5

Source: Own source, 2023

From the result in table above the following figure was developed to show the ranks of methods for the price escalation management/administration. Table 4.12 shows, the statistical results of methods to manage/administer price escalation relative importance index and their respective ranks. From the table it is observed that there are some factors which have similar relative importance index and the ranks of those methods place at the same level of importance.

As discussed earlier consider fluctuation/escalation clauses dominantly lead methods to administer price escalation as a very important one for the construction projects. Consider locally available material in design and regular cost monitoring throughout the project placed as second important methods. Therefore bulk material purchases and suppliers' partnerships followed by use cost-Plus contracts 4th and 5th important methods to manage/administer price escalation respectively.

The agreements between the respondents (i.e. between client-consultant, client-contractors and contractors-consultants) in ranking the methods have been calculated through spearman's rank correlation coefficient.

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The Spearman's rank correlation coefficient in the table (Table 4.13) shows that relatively there is a moderate positive agreement between Contractors-Consultants, very weak negative agreement between Clients-Contractors and moderate negative agreement between Clients-Consultants in ranking methods to manage/administer price escalation which has a significant contribution to the successful performance of Addis Ababa design and construction works bureau.

Table 4.13: Correlations among respondents in ranking methods to manage/administer price escalation

	Spearman's rank correlation coefficient (r's)		
Respondents	Clients	Consultants	Contractors
Clients	1	-0.58	-0.2
Consultants	-0.58	1	+0.7
Contractors	-0.2	+0.7	1

Source: Own source, 2023

4.3. Results of market survey

This section presents and discusses the results obtained from the market survey which was conducted to determine the period and extent of escalation in price of reinforcement steel and cement which are some of the main construction materials. Financial documents from the sampled building materials supplier stores and data from con.2merkato.com were used to collect the prices. The stores purchase reinforcement bars from steel factories in the country and the prices used are selling prices of the steel factories. Prices for the past three years were first collected and analyzed to determine the trends in price fluctuation. The escalation period was identified and the extent of escalation in the period was then determined. The results of the analysis are presented in the following sub-sections.

4.3.1. Market price trends and the period of escalation for reinforcement steel

Monthly prices of reinforcement bars for the period from Jun-2020 to Jun-2023 were collected and average monthly prices per kilogram were calculated. Figure 4.1 below shows the average price of reinforcement bars as determined in the market survey analysis. The price at Jun-2023 i.e., 37.58 Birr per kilogram was used as benchmark (BM) price to analyze the price fluctuation trend in the period up to Jun-2023. As can be seen in Figure 4.1 below, average monthly price of reinforcement bars was relatively stable from Jun-2020 up to Dec-2020 with fluctuations less than 5 Birr compared to the reference price. However, price began to rise for the rest of the period and continued to rise significantly for period up to Jun-2023 where the price reached 151.9 Birr per kilogram with 114.32 Birr increase in price compared to the reference price.

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Table 4.14: Average monthly prices reinforcement bars per kilogram

Month	<i>Jun-23</i>	<i>May-23</i>	<i>Apr-23</i>	<i>Mar-23</i>	<i>Feb-23</i>	<i>Jan-23</i>	<i>Dec-22</i>	<i>Nov-22</i>
Price per kg	151.9	137	119.2	119.2	113.92	107.6	109.7	122
Month	<i>Oct-22</i>	<i>Sep-22</i>	<i>Aug-22</i>	<i>Jul-22</i>	<i>Jun-22</i>	<i>May-22</i>	<i>Apr-22</i>	<i>Mar-22</i>
Price per kg	120	105.49	109.91	113.2	114	107	112.14	95
Month	<i>Feb-22</i>	<i>Jan-22</i>	<i>Dec-21</i>	<i>Nov-21</i>	<i>Oct-21</i>	<i>Sep-21</i>	<i>Aug-21</i>	<i>Jul-21</i>
Price per kg	83	78	77.96	68.53	64.2	77.5	77.49	71.96
Month	<i>Jun-21</i>	<i>May-21</i>	<i>Apr-21</i>	<i>Mar-21</i>	<i>Feb-21</i>	<i>Dec-20</i>	<i>Nov-20</i>	<i>Oct-20</i>
Price per kg	54.4	56.75	56.66	51.03	55.4	43.5	40.15	38.84
Month	<i>Sep-20</i>	<i>Sep-20</i>	<i>Aug-20</i>	<i>Jul-20</i>	<i>Jun-20</i>			
Price per kg	39.1	39.01	38.66	38.4	37.58			

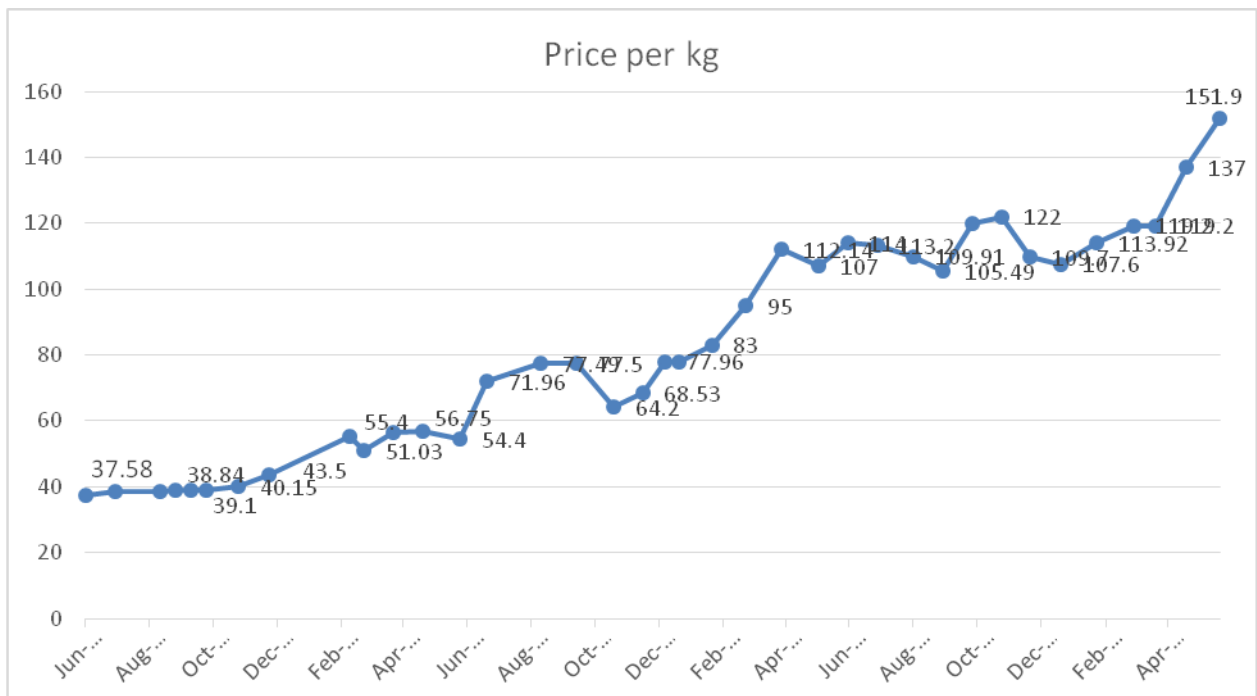


Figure 4.1: Average monthly price of steel reinforcement bars per kg from Jun-2020 to Jun-2023

The percentage escalation of price follows the same pattern. Figure 4.2 below shows the escalation in price as percentage of the reference price and the average escalation in the period up to Jun-23.

The result shows that the range of price fluctuation was less than 15% of the reference price up to Dec-2020. Price fluctuation exceeded 15% on Feb-21 where price raised with 15.75% of the

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reference price marking the beginning of the escalation which continued for the following one year reaching the peak 304.2% rise on Jun-23.

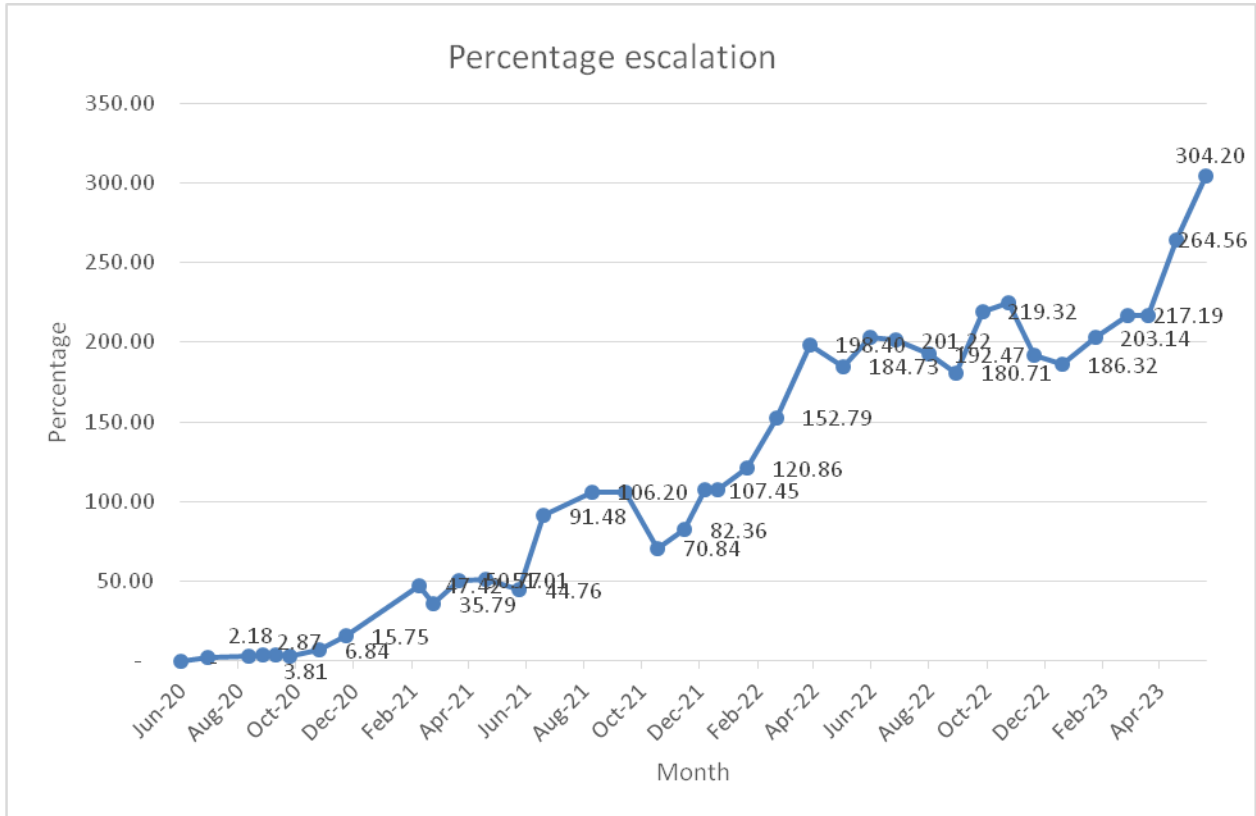


Figure 4.2: Escalation in price of steel reinforcement bars as percentage of BM price

According to the results discussed above, the escalation period started on Dec-2020 and continued up to Jun-23 where this market survey was conducted on. Hence projects launched in the eve of the escalation period were considered as potential subjects to the influence of the escalation.

4.3.1. Market price trends and the period of escalation for cement

Monthly prices of cement for the period from Sep-20 to May-2023 were collected and average monthly prices per quintal were calculated. Figure 4.3 below shows the average price of cement as determined in the market survey analysis. The price at Sep-2023 i.e., 520 Birr per quintal was used as benchmark (BM) price to analyze the price fluctuation trend in the period up to May-2023. As can be seen in Figure 4.3 below, average monthly price of cement was relatively stable from Sep-2020 up to Mar-22 with fluctuations less than 85 Birr compared to the reference price. However, price began to rise for the rest of the period and continued to rise significantly for period up to May-2023 where the price reached 1750 Birr per quintal with 1230 Birr increase in price compared to the reference price.

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Table 4.15: Average monthly prices cement per quintal

Month	May-23	Apr-23	Mar-23	Feb-23	Jan-23	Dec-22	Nov-22	Oct-22
Price per qut	1750	2000	1570	1570	1570	2000	2000	1700
Month	Sep-22	Aug-22	Jul-22	Jun-22	May-22	Apr-22	Mar-22	Mar-22
Price per qut	1600	1350	1100	1000	1100	1000	890	605
Month	Feb-22	Jan-22	Dec-21	Nov-21	Oct-21	Sep-21	Aug-21	Jul-21
Price per qut	605	590	510	540	620	690	680	480
Month	Jun-21	May-21	Apr-21	Mar-21	Feb-21	Jan-21	Dec-20	Nov-20
Price per qut	450	450	450	740	525	550	520	500
Month	Oct-20	Sep-20						
Price per qut	480	520						

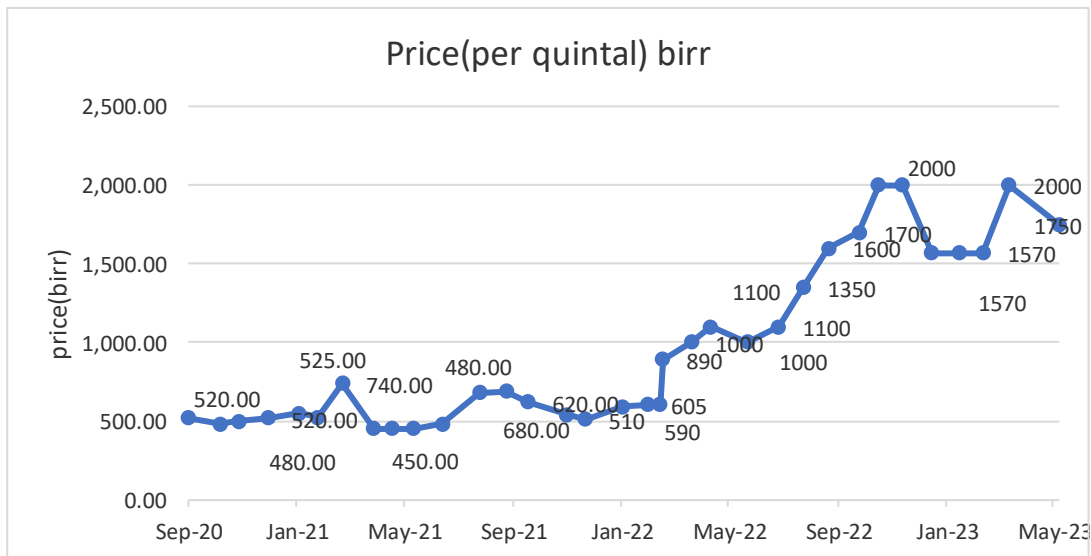


Figure 4.3: Average monthly price of cement per quintal from Sep-2020 to May-2023

The percentage escalation of price follows the same pattern. Figure 4.4 below shows the escalation in price as percentage of the reference price and the average escalation in the period up to Sep-23.

The result shows that the range of price fluctuation was less than 16% of the reference price up to Feb-2022. Price fluctuation exceeded 16% on Mar-2022 where price raised with 16.33% of the reference price marking the beginning of the escalation which continued for the following one year reaching the peak 236.54 % rise on May-23.

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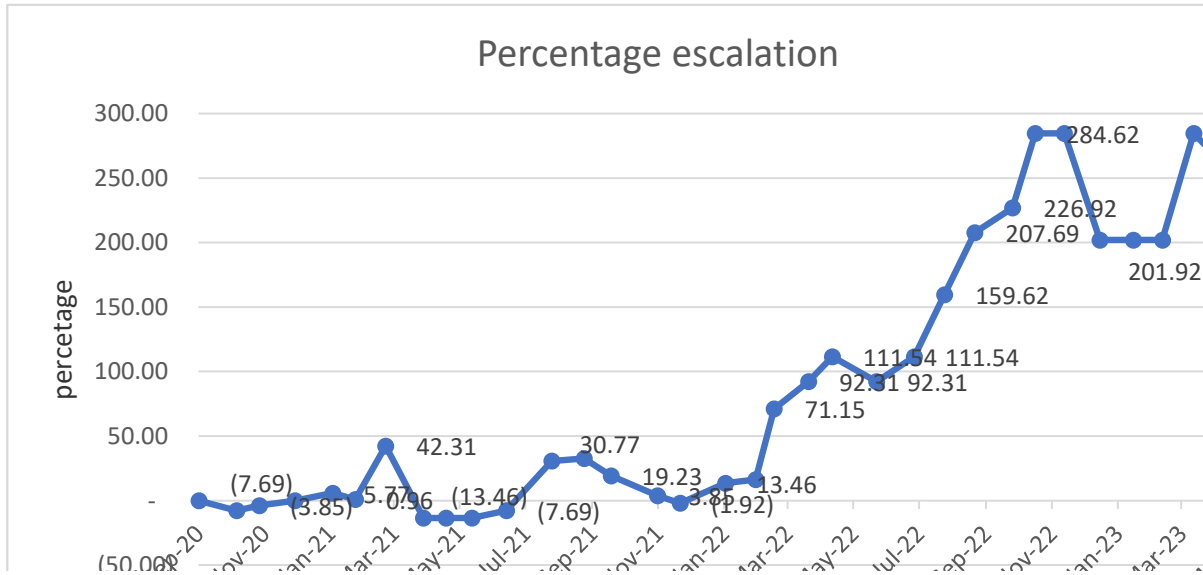


Figure 4.4: Escalation in price of steel reinforcement bars as percentage of BM price

According to the results discussed above, the escalation period started on Mar-2020 and continued up to May-23 where this market survey was conducted on. Hence projects launched in the eve of the escalation period were considered as potential subjects to the influence of the escalation.

CHAPTER FIVE

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Based on the findings of the data analysis and discussion in the preceding chapter, this chapter delivers the research's conclusions and suggestions.

The objectives of the research were to assess the causes and effects of price escalation, to identify problems of price escalation adjustment, to assess the present price escalation administration system and to forward recommendations which can assist in improving the price escalation administration on Addis Ababa design and construction works bureau. To achieve these objectives, the study used questionnaire survey as a research instruments. The information gathered from the survey was analyzed using the relative importance index and correlated using spearman's correlation coefficient.

The following conclusions have been developed and summarized in accordance with the objectives of the research based on the findings from the analysis.

Assessing the causes and effects of price escalation was the initial goal of this study. To achieve this, a questionnaire survey containing factors causing price escalation (i.e. internal and external) which were identified from literatures and desk study were ranked by respondents based on the frequency of occurrence. The results showed that:

Poor estimation, improper planning and/or improper implementation of proper planning and project schedule changes are identified as major internal causes of price escalation in Addis Ababa design and construction works bureau.

Besides, increase in material cost/material price fluctuation, fluctuation in money exchange rates and limited capacity of material producers are identified as major external causes of price escalation.

Higher project costs, issues with project funding and cash flow, delays, and disagreements between partners identified as the major effects of price escalation in this research.

The next objective of this research was to identify the problems of price escalation and adjustment. The questionnaire survey results indicated that uncompensated increase in cost of construction materials, construction price indices may over estimate or under estimate the market conditions as at how prices have risen and selection of the most suitable index in using inflation indices are identified as major problems of price escalation and adjustment in Addis Ababa design and construction works bureau.

The third objective of the research is to assess the current price escalation management system (practice). From the results of questionnaire survey the respondents groups; 36%, 20% and 14%

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of clients, consultants and contractors respectively, showed the current price escalation administration system (practice) in Addis Ababa design and construction works bureau as very good. And it is rated good by 50%, 35% and 36% of clients, consultants and contractors respectively. However, 14% of contractors and 20% consultants believe the current price escalation management system (practice) in Addis Ababa design and construction works bureau as poor.

The final objective was to recommend how to improve the administration of price escalation in Addis Ababa design and construction works bureau projects. To achieve this, a questionnaire survey containing methods to manage/administer price escalation which were identified from literatures were ranked by respondents based on the degree of importance.

Consider fluctuation/escalation clauses, consider locally available materials in design, regular cost monitoring throughout the project and develop program wide contingencies and risk management protocol are identified as major methods to manage/administer price escalation in Addis Ababa design and construction works bureau.

Based on the market survey, projects started after Dec-2020 up to Jun-23 considered as potential subjects to the influence of the escalation because of the escalation of reinforcement bar. Projects started after Mar-2020 up to May-23 considered as potential subjects to the influence of the escalation in terms of price escalation of cement.

From the results of questionnaire survey the majority of respondent groups, 93%, 85% and 86% of clients, consultants and contractors respectively, showed their agreement with price indices/formula method of price adjustment. However, the remaining 7% clients, 15% consultants and 14% contractors respondents agreed with proven/base price adjustment method is better.

5.2. Recommendations

The objective of this research was to generate findings from the hypothesized problems addressed in the literature review through questionnaire survey. Additionally, one of the goals of this thesis was to present suggestions for how to better manage price escalation in Addis Ababa design and construction works bureau in light of the study's findings. As a result, the recommendation will concentrate on solving the main issues discovered during the study procedures.

For the successful execution of construction projects, the other proposal is to contracting parties to continuously focus and address those identified elements and concerns during their construction progress meetings. In addition they should strongly focus on construction management capacity building to realize the management. Based on the findings of the research, the following recommendations are expected from key role players in construction projects.

For Clients

- The clients should put effort into the projects' planning phase. It is important to properly plan a project in terms of time, money, quality, and resources. Before beginning construction, it is important to properly arrange all of the resources needed for the project.
- Based on knowledge and analysis of construction's various components (labor, materials, equipment, etc.), update construction cost estimates. Cost estimates, for example, should be based on experience and knowledge of the project's conditions rather than historical data adjusted for inflation increases over time.
- The clients should determine the required duration of project and impose realistic duration to avoid time and cost overruns.
- It is advised for clients to have technical professionals that can oversee the various stages of any project, monitor performance percentages, and compare actual performance to anticipated performance.
- The clients should plan some measures to share the risks of escalation and correctly predict future pricing instability.
- Consider price escalation effects seriously and make a decision on the way that price escalation effect is fairly shared through provision of appropriate price adjustment clauses in special conditions of contract.

For Consultants

- A trained technical staff should be hired by consultants to manage the project well so that he can handle any management or technical issues that may arise.
- In order to prevent price escalation, it is also essential that the consultant has high qualifications so that they can provide appropriate guidance at the right moment and be able to respond to any questions posed by the contractor.
- The consultant should Study the likely occurrence of price escalation and device mitigation plan before the project suffers.
- The consultant should carry on their regular progress meeting but focus on the effectiveness of each meeting.

For Contractors

- As soon as a project is awarded, administrative and technical people should be allocated for site management and supervision to establish plans for completion within the allotted time with the anticipated quality and cost.
- Contractors should concentrate on planning (work breakdown structure, scheduling, resource allocation, etc.) during project execution because these factors improve effective

site management in utilizing and coordinating labor, equipment, and materials for project success.

- They are encouraged to buy the construction materials on time since they should be aware of them. In order to prevent shortages or a lack of materials, it is also preferable for them to establish a schedule for the process of delivering materials to the site.
- Adequate qualified technical staff with appropriate experience of the project in order to be able to follow the different technical and managerial aspects of the project.
- Before starting any job, contractors should have enough cash on hand to avoid any financial issues. Additionally, it is advised to keep an eye on the project's financial spending and payments because any issues with the finances may create delays and cost increases.
- The contractor should consider price escalation effects critically before tender submission and should agree on the way that price escalation effects is fairly shared through provisions in conditions of contract.
- It is advised that contractors create a time schedule outlining their requirements for site-specific tools and supplies so that they will be available when needed right away. So they would be able to detect performance in the work and to follow the time schedule continuously.

As For All Parties

- Create a more precise strategy and method for calculating price escalation, i.e., set uniform standards and better methods needed for tracking, predicting, and computing price indices.
- There has to be a best practice cost estimation standard that agencies may compare their own manuals, processes, and procedures against and, if necessary, update in order to improve the quality and reliability of project cost estimates.
- The technique of price adjustment calculation should be fair and uniform across all parties, and all parties should cooperate to recover the compensation system.

For Government

- The government should establish an atmosphere of economic stability that is sufficient to entice investors, particularly in the production of construction materials to be produced from local materials and production of enough quantity and quality of construction materials in the local market, as this will limit excessive price fluctuations associated with imported construction materials.
- A regulatory agency should compile and release the most recent indices every so often. This implies that any change in the price of commodities and labor on the market should be noted and documented in order to prepare the indices for formula-based system adjustments.

For Further Study

In addition current research, the following is some areas recommended for further studies.

By expanding the sample size and doing a deeper analysis of the subject, the current research can be developed. Additionally, gather data at the project sites that have been chosen rather than the branch offices. This increases the accuracy of the data. If questionnaire is used as a tool for data collection the level of knowledge and level of understanding of the respondents in responding the questions should be put under consideration. Whereas archival records are used as data collection tools, reports of different contracting parties should be reviewed in order to obtain multiple evidences.

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Appendix A: Market study data

Table A1: Price of steel reinforcement bars per Kg (source 2merkato.com)

Last Checked	Price	Change(Br)	Change(%)	Data Source
3-Jun-23	151.90 Br per kg	--	--	Megenagna
27-May-23	151.90 Br per kg	1.06 Br	0.7%	Teklehaymanot (Merkato)
20-May-23	150.84 Br per kg	4.22 Br	2.8%	Teklehaymanot (Merkato)
13-May-23	146.62 Br per kg	9.62 Br	6.56%	Megenagna
1-May-23	137.00 Br per kg	8.31 Br	6.07%	Teklehaymanot (Merkato)
26-Apr-23	128.69 Br per kg	9.49 Br	7.37%	Megenagna
19-Apr-23	119.20 Br per kg	--	--	Teklehaymanot (Merkato)
1-Apr-23	119.20 Br per kg	--	--	Megenagna
25-Mar-23	119.20 Br per kg	--	--	Teklehaymanot (Merkato)
18-Mar-23	119.20 Br per kg	--	--	Megenagna
11-Mar-23	119.20 Br per kg	5.28 Br	4.43%	Teklehaymanot (Merkato)
3-Mar-23	113.92 Br per kg	--	--	Megenagna
4-Feb-23	113.92 Br per kg	--	--	Teklehaymanot (Merkato)
28-Jan-23	113.92 Br per kg	1.05 Br	0.92%	Megenagna
21-Jan-23	112.87 Br per kg	--	--	Teklehaymanot (Merkato)
13-Jan-23	112.87 Br per kg	--	--	Megenagna
7-Jan-23	112.87 Br per kg	5.27 Br	4.67%	Teklehaymanot (Merkato)
1-Jan-23	107.60 Br per kg	--	--	Megenagna
24-Dec-22	107.60 Br per kg	5.27 Br	4.9%	Teklehaymanot (Merkato)
10-Dec-22	112.87 Br per kg	3.17 Br	2.81%	Megenagna
2-Dec-22	109.70 Br per kg	3.70 Br	3.37%	Teklehaymanot (Merkato)
25-Nov-22	113.40 Br per kg	0.53 Br	0.47%	Megenagna
19-Nov-22	112.87 Br per kg	9.13 Br	8.09%	Teklehaymanot (Merkato)
11-Nov-22	122.00 Br per kg	--	--	Megenagna
5-Nov-22	122.00 Br per kg	4.00 Br	3.28%	Teklehaymanot (Merkato)
29-Oct-22	118.00 Br per kg	2.00 Br	1.69%	Megenagna
15-Oct-22	120.00 Br per kg	--	--	Teklehaymanot (Merkato)
8-Oct-22	120.00 Br per kg	13.04 Br	10.87%	Teklehaymanot (Merkato)
1-Oct-22	106.96 Br per kg	1.47 Br	1.37%	Megenagna
24-Sep-22	105.49 Br per kg	--	--	Teklehaymanot (Merkato)
17-Sep-22	105.49 Br per kg	--	--	Megenagna
10-Sep-22	105.49 Br per kg	1.06 Br	1%	Teklehaymanot (Merkato)
3-Sep-22	104.43 Br per kg	1.06 Br	1.02%	Megenagna
27-Aug-22	105.49 Br per kg	2.11 Br	2%	Teklehaymanot (Merkato)
20-Aug-22	107.60 Br per kg	2.31 Br	2.15%	Megenagna
13-Aug-22	109.91 Br per kg	1.90 Br	1.73%	Megenagna
6-Aug-22	111.81 Br per kg	1.30 Br	1.16%	Teklehaymanot (Merkato)

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30-Jul-22	113.11 Br per kg	1.30 Br	1.15%	Megenagna
23-Jul-22	111.81 Br per kg	1.39 Br	1.24%	Teklehaymanot (Merkato)
16-Jul-22	113.20 Br per kg	--	--	Megenagna
9-Jul-22	113.20 Br per kg	0.35 Br	0.31%	Teklehaymanot (Merkato)
2-Jul-22	112.85 Br per kg	--	--	Megenagna
25-Jun-22	112.85 Br per kg	1.15 Br	1.02%	Teklehaymanot (Merkato)
18-Jun-22	114.00 Br per kg	--	--	Megenagna
11-Jun-22	114.00 Br per kg	1.00 Br	0.88%	Teklehaymanot (Merkato)
4-Jun-22	115.00 Br per kg	5.00 Br	4.35%	Megenagna
28-May-22	110.00 Br per kg	--	--	Teklehaymanot (Merkato)
21-May-22	110.00 Br per kg	3.00 Br	2.73%	Megenagna
14-May-22	107.00 Br per kg	0.20 Br	0.19%	Teklehaymanot (Merkato)
7-May-22	106.80 Br per kg	--	--	Megenagna
1-May-22	106.80 Br per kg	3.11 Br	2.91%	Megenagna
16-Apr-22	109.91 Br per kg	2.23 Br	2.03%	Teklehaymanot (Merkato)
9-Apr-22	112.14 Br per kg	3.86 Br	3.44%	Teklehaymanot (Merkato)
2-Apr-22	116.00 Br per kg	--	--	Megenagna
26-Mar-22	116.00 Br per kg	7.00 Br	6.03%	Teklehaymanot (Merkato)
18-Mar-22	123.00 Br per kg	8.00 Br	6.5%	Megenagna
12-Mar-22	115.00 Br per kg	20.00 Br	17.39%	Teklehaymanot (Merkato)
5-Mar-22	95.00 Br per kg	--	--	Megenagna
26-Feb-22	95.00 Br per kg	5.00 Br	5.26%	Teklehaymanot (Merkato)
19-Feb-22	90.00 Br per kg	7.00 Br	7.78%	Megenagna
12-Feb-22	83.00 Br per kg	--	--	Teklehaymanot (Merkato)
1-Feb-22	83.00 Br per kg	2.00 Br	2.41%	Megenagna
29-Jan-22	81.00 Br per kg	1.00 Br	1.23%	Teklehaymanot (Merkato)
22-Jan-22	80.00 Br per kg	0.65 Br	0.81%	Megenagna
15-Jan-22	80.65 Br per kg	2.65 Br	3.29%	Megenagna
8-Jan-22	78.00 Br per kg	--	--	Teklehaymanot (Merkato)
1-Jan-22	78.00 Br per kg	0.02 Br	0.03%	Megenagna
25-Dec-21	77.98 Br per kg	0.02 Br	0.03%	Megenagna
18-Dec-21	77.96 Br per kg	--	--	Teklehaymanot (Merkato)
11-Dec-21	77.96 Br per kg	--	--	Megenagna
4-Dec-21	77.96 Br per kg	9.43 Br	12.1%	Megenagna
27-Nov-21	68.53 Br per kg	10.38 Br	15.15%	Teklehaymanot (Merkato)
20-Nov-21	78.91 Br per kg	0.95 Br	1.2%	Megenagna
13-Nov-21	77.96 Br per kg	13.76 Br	17.65%	Megenagna
6-Nov-21	64.20 Br per kg	--	--	Megenagna
30-Oct-21	64.20 Br per kg	2.22 Br	3.46%	Megenagna
23-Oct-21	66.42 Br per kg	1.06 Br	1.6%	Teklehaymanot (Merkato)
16-Oct-21	67.48 Br per kg	3.02 Br	4.48%	Teklehaymanot (Merkato)

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8-Oct-21	70.50 Br per kg	7.00 Br	9.93%	Megenagna
25-Sep-21	77.50 Br per kg	0.01 Br	0.01%	Teklehaymanot (Merkato)
20-Sep-21	77.49 Br per kg	--	--	Megenagna
13-Sep-21	77.49 Br per kg	--	--	Teklehaymanot (Merkato)
4-Sep-21	77.49 Br per kg	3.16 Br	4.08%	Megenagna
28-Aug-21	80.65 Br per kg	3.16 Br	3.92%	Teklehaymanot (Merkato)
22-Aug-21	77.49 Br per kg	--	--	Megenagna
14-Aug-21	77.49 Br per kg	2.11 Br	2.72%	Teklehaymanot (Merkato)
8-Aug-21	79.60 Br per kg	2.40 Br	3.02%	Megenagna
1-Aug-21	82.00 Br per kg	--	--	Teklehaymanot (Merkato)
25-Jul-21	82.00 Br per kg	0.03 Br	0.04%	Megenagna
18-Jul-21	81.97 Br per kg	10.03 Br	12.24%	Teklehaymanot (Merkato)
10-Jul-21	71.94 Br per kg	0.01 Br	0.01%	Megenagna
3-Jul-21	71.95 Br per kg	0.05 Br	0.07%	Megenagna
1-Jul-21	71.96 Br per kg	17.48 Br	24.29%	Megenagna
1-Jul-21	71.90 Br per kg	17.42 Br	24.23%	Teklehaymanot (Merkato)
26-Jun-21	54.48 Br per kg	0.03 Br	0.06%	Teklehaymanot (Merkato)
12-Jun-21	54.45 Br per kg	0.05 Br	0.09%	Megenagna
5-Jun-21	54.40 Br per kg	--	--	Teklehaymanot (Merkato)
1-Jun-21	54.40 Br per kg	0.03 Br	0.06%	Megenagna
23-May-21	54.37 Br per kg	--	--	Teklehaymanot (Merkato)
16-May-21	54.37 Br per kg	0.02 Br	0.04%	Megenagna
8-May-21	54.35 Br per kg	2.40 Br	4.42%	Megenagna
1-May-21	56.75 Br per kg	0.03 Br	0.05%	Teklehaymanot (Merkato)
24-Apr-21	56.72 Br per kg	0.02 Br	0.04%	Megenagna
17-Apr-21	56.70 Br per kg	0.04 Br	0.07%	Teklehaymanot (Merkato)
3-Apr-21	56.66 Br per kg	--	--	Megenagna
27-Mar-21	56.66 Br per kg	0.25 Br	0.44%	Megenagna
20-Mar-21	56.41 Br per kg	5.31 Br	9.41%	Teklehaymanot (Merkato)
13-Mar-21	51.10 Br per kg	0.03 Br	0.06%	Megenagna
6-Mar-21	51.03 Br per kg	4.37 Br	8.56%	Teklehaymanot (Merkato)
6-Mar-21	51.07 Br per kg	4.33 Br	8.48%	Megenagna
27-Feb-21	55.40 Br per kg	--	--	Megenagna
20-Feb-21	55.35 Br per kg	1.55 Br	2.8%	Teklehaymanot (Merkato)
20-Feb-21	55.40 Br per kg	1.50 Br	2.71%	Megenagna
13-Feb-21	56.98 Br per kg	1.58 Br	2.77%	Megenagna
13-Feb-21	56.90 Br per kg	1.50 Br	2.64%	Teklehaymanot (Merkato)
6-Feb-21	55.35 Br per kg	5.65 Br	10.21%	Teklehaymanot (Merkato)
6-Feb-21	55.40 Br per kg	5.60 Br	10.11%	Megenagna
30-Jan-21	61.00 Br per kg	0.22 Br	0.36%	Merkato
23-Jan-21	61.40 Br per kg	--	--	Megenagna

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23-Jan-21	61.22 Br per kg	0.18 Br	0.29%	Teklehaymanot (Merkato)
9-Jan-21	61.22 Br per kg	5.87 Br	9.59%	Teklehaymanot (Merkato)
9-Jan-21	61.40 Br per kg	6.05 Br	9.85%	Megenagna
26-Dec-20	51.92 Br per kg	5.00 Br	9.63%	Teklehaymanot (Merkato)
26-Dec-20	55.35 Br per kg	8.43 Br	15.23%	Megenagna
19-Dec-20	47.18 Br per kg	--	--	Megenagna
19-Dec-20	46.92 Br per kg	0.26 Br	0.55%	Teklehaymanot (Merkato)
12-Dec-20	46.92 Br per kg	3.42 Br	7.29%	Teklehaymanot (Merkato)
12-Dec-20	47.18 Br per kg	3.68 Br	7.8%	Megenagna
5-Dec-20	44.00 Br per kg	1.30 Br	2.95%	Megenagna
5-Dec-20	43.50 Br per kg	0.80 Br	1.84%	Teklehaymanot (Merkato)
28-Nov-20	42.50 Br per kg	0.17 Br	0.4%	Teklehaymanot (Merkato)
28-Nov-20	42.70 Br per kg	0.03 Br	0.07%	Megenagna
21-Nov-20	42.49 Br per kg	0.18 Br	0.42%	Teklehaymanot (Merkato)
21-Nov-20	42.67 Br per kg	--	--	Megenagna
16-Nov-20	42.49 Br per kg	2.34 Br	5.51%	Teklehaymanot (Merkato)
16-Nov-20	42.67 Br per kg	2.52 Br	5.91%	Megenagna
6-Nov-20	40.59 Br per kg	0.44 Br	1.08%	Megenagna
6-Nov-20	40.15 Br per kg	--	--	Teklehaymanot (Merkato)
31-Oct-20	40.59 Br per kg	0.56 Br	1.38%	Megenagna
31-Oct-20	40.15 Br per kg	1.00 Br	2.49%	Teklehaymanot (Merkato)
26-Oct-20	41.12 Br per kg	0.03 Br	0.07%	Teklehaymanot (Merkato)
26-Oct-20	41.15 Br per kg	--	--	Megenagna
19-Oct-20	41.12 Br per kg	2.12 Br	5.16%	Teklehaymanot (Merkato)
19-Oct-20	41.15 Br per kg	2.15 Br	5.22%	Megenagna
13-Oct-20	39.00 Br per kg	0.16 Br	0.41%	Megenagna
6-Oct-20	38.84 Br per kg	0.04 Br	0.1%	Teklehaymanot (Merkato)
28-Sep-20	39.01 Br per kg	0.09 Br	0.23%	Megenagna
28-Sep-20	38.88 Br per kg	0.22 Br	0.57%	Teklehaymanot (Merkato)
21-Sep-20	38.92 Br per kg	--	--	Teklehaymanot (Merkato)
21-Sep-20	39.10 Br per kg	0.18 Br	0.46%	Megenagna
14-Sep-20	39.10 Br per kg	0.09 Br	0.23%	Megenagna
14-Sep-20	38.92 Br per kg	0.09 Br	0.23%	Teklehaymanot (Merkato)
7-Sep-20	38.66 Br per kg	0.35 Br	0.91%	Teklehaymanot (Merkato)
7-Sep-20	39.01 Br per kg	--	--	Megenagna
31-Aug-20	38.66 Br per kg	--	--	Teklehaymanot (Merkato)
31-Aug-20	39.01 Br per kg	0.35 Br	0.9%	Megenagna
23-Aug-20	39.01 Br per kg	2.46 Br	6.31%	Megenagna
23-Aug-20	38.66 Br per kg	2.11 Br	5.46%	Teklehaymanot (Merkato)
27-Jul-20	36.64 Br per kg	1.76 Br	4.8%	Megenagna
27-Jul-20	36.55 Br per kg	1.85 Br	5.06%	Teklehaymanot (Merkato)

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18-Jul-20	37.90 Br per kg	0.50 Br	1.32%	Teklehaymanot (Merkato)
18-Jul-20	38.40 Br per kg	--	--	Megenagna
11-Jul-20	38.40 Br per kg	0.50 Br	1.3%	Teklehaymanot (Merkato)
1-Jul-20	37.90 Br per kg	--	--	Various Spots in Addis
27-Jun-20	38.40 Br per kg	0.45 Br	1.17%	Megenagna
27-Jun-20	37.90 Br per kg	0.05 Br	0.13%	Teklehaymanot (Merkato)
20-Jun-20	38.48 Br per kg	0.90 Br	2.34%	Megenagna
20-Jun-20	37.95 Br per kg	0.37 Br	0.97%	Teklehaymanot (Merkato)
13-Jun-20	38.48 Br per kg	0.90 Br	2.34%	Megenagna
13-Jun-20	37.58 Br per kg	--	--	Teklehaymanot (Merkato)

Table A2: Price of cement per quintal (source 2merkato.com)

Last Checked	Price	Change(Br)	Change(%)	Data Source
27-May-23	1,750.00 Br per quintal	50.00 Br	2.86%	Various Spots in Addis
20-May-23	1,800.00 Br per quintal	150.00 Br	8.33%	Various Spots in Addis
1-May-23	1,950.00 Br per quintal	50.00 Br	2.56%	Various Spots in Addis
19-Apr-23	2,000.00 Br per quintal	--	--	Various Spots in Addis
1-Apr-23	2,000.00 Br per quintal	--	--	Various Spots in Addis
25-Mar-23	2,000.00 Br per quintal	--	--	Various Spots in Addis
11-Mar-23	2,000.00 Br per quintal	430.00 Br	21.5%	Various Spots in Addis
3-Mar-23	1,570.00 Br per quintal	--	--	Various Spots in Addis
4-Feb-23	1,570.00 Br per quintal	--	--	Various Spots in Addis
21-Jan-23	1,570.00 Br per quintal	--	--	Various Spots in Addis
13-Jan-23	1,570.00 Br per quintal	--	--	Various Spots in Addis
7-Jan-23	1,570.00 Br per quintal	--	--	Megenagna
4-Jan-23	1,570.00 Br per quintal	30.00 Br	1.91%	Megenagna
1-Jan-23	1,600.00 Br per quintal	400.00 Br	25%	Various Spots in Addis
24-Dec-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
10-Dec-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
2-Dec-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
25-Nov-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
11-Nov-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
5-Nov-22	2,000.00 Br per quintal	--	--	Various Spots in Addis
29-Oct-22	2,000.00 Br per quintal	300.00 Br	15%	Various Spots in Addis
15-Oct-22	1,700.00 Br per quintal	--	--	Various Spots in Addis
8-Oct-22	1,700.00 Br per quintal	100.00 Br	5.88%	Various Spots in Addis
10-Sep-22	1,600.00 Br per quintal	--	--	Megenagna
3-Sep-22	1,600.00 Br per quintal	250.00 Br	15.63%	Megenagna
13-Aug-22	1,350.00 Br per quintal	--	--	Megenagna

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30-Jul-22	1,350.00 Br per quintal	50.00 Br	3.7%	Megenagna
23-Jul-22	1,300.00 Br per quintal	200.00 Br	15.38%	Megenagna
16-Jul-22	1,100.00 Br per quintal	100.00 Br	9.09%	Megenagna
25-Jun-22	1,000.00 Br per quintal	--	--	Megenagna
18-Jun-22	1,000.00 Br per quintal	--	--	Megenagna
11-Jun-22	1,000.00 Br per quintal	--	--	Megenagna
4-Jun-22	1,000.00 Br per quintal	--	--	Megenagna
21-May-22	1,000.00 Br per quintal	100.00 Br	10%	Megenagna
1-May-22	1,100.00 Br per quintal	100.00 Br	9.09%	Megenagna
16-Apr-22	1,000.00 Br per quintal	--	--	Megenagna
9-Apr-22	1,000.00 Br per quintal	50.00 Br	5%	Megenagna
2-Apr-22	950.00 Br per quintal	50.00 Br	5.26%	Megenagna
26-Mar-22	900.00 Br per quintal	--	--	Megenagna
18-Mar-22	900.00 Br per quintal	--	--	Megenagna
12-Mar-22	900.00 Br per quintal	10.00 Br	1.11%	Megenagna
8-Mar-22	890.00 Br per quintal	285.00 Br	32.02%	Megenagna
5-Mar-22	605.00 Br per quintal	--	--	Megenagna
26-Feb-22	605.00 Br per quintal	--	--	Megenagna
19-Feb-22	605.00 Br per quintal	--	--	Megenagna
12-Feb-22	605.00 Br per quintal	15.00 Br	2.48%	Megenagna
5-Feb-22	590.00 Br per quintal	--	--	Megenagna
29-Jan-22	590.00 Br per quintal	--	--	Megenagna
22-Jan-22	590.00 Br per quintal	20.00 Br	3.39%	Megenagna
15-Jan-22	610.00 Br per quintal	100.00 Br	16.39%	Megenagna
8-Jan-22	510.00 Br per quintal	--	--	Megenagna
1-Jan-22	510.00 Br per quintal	--	--	Megenagna
25-Dec-21	510.00 Br per quintal	--	--	Megenagna
11-Dec-21	510.00 Br per quintal	--	--	Megenagna
4-Dec-21	510.00 Br per quintal	30.00 Br	5.88%	Megenagna
27-Nov-21	540.00 Br per quintal	--	--	Megenagna
20-Nov-21	540.00 Br per quintal	20.00 Br	3.7%	Megenagna
13-Nov-21	560.00 Br per quintal	20.00 Br	3.57%	Megenagna
6-Nov-21	540.00 Br per quintal	--	--	Megenagna
30-Oct-21	540.00 Br per quintal	5.00 Br	0.93%	Megenagna
23-Oct-21	535.00 Br per quintal	85.00 Br	15.89%	Megenagna
16-Oct-21	620.00 Br per quintal	--	--	Megenagna
8-Oct-21	620.00 Br per quintal	25.00 Br	4.03%	Megenagna
25-Sep-21	645.00 Br per quintal	45.00 Br	6.98%	Megenagna
18-Sep-21	690.00 Br per quintal	--	--	Megenagna
13-Sep-21	690.00 Br per quintal	--	--	Megenagna
4-Sep-21	690.00 Br per quintal	--	--	Megenagna

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28-Aug-21	690.00 Br per quintal	10.00 Br	1.45%	Megenagna
22-Aug-21	680.00 Br per quintal	--	--	Various Spots in Addis
14-Aug-21	680.00 Br per quintal	10.00 Br	1.47%	Megenagna
8-Aug-21	690.00 Br per quintal	210.00 Br	30.43%	Megenagna
3-Jul-21	480.00 Br per quintal	--	--	Megenagna
1-Jul-21	480.00 Br per quintal	30.00 Br	6.25%	Megenagna
1-Jun-21	450.00 Br per quintal	--	--	Megenagna
23-May-21	450.00 Br per quintal	--	--	Megenagna
16-May-21	450.00 Br per quintal	--	--	Megenagna
8-May-21	450.00 Br per quintal	--	--	Megenagna
1-May-21	450.00 Br per quintal	--	--	Megenagna
24-Apr-21	450.00 Br per quintal	--	--	Megenagna
17-Apr-21	450.00 Br per quintal	--	--	Megenagna
10-Apr-21	450.00 Br per quintal	30.00 Br	6.67%	Megenagna
3-Apr-21	420.00 Br per quintal	30.00 Br	7.14%	Megenagna
27-Mar-21	450.00 Br per quintal	290.00 Br	64.44%	Megenagna
20-Mar-21	740.00 Br per quintal	--	--	Megenagna
13-Mar-21	740.00 Br per quintal	180.00 Br	24.32%	Various Spots in Addis
27-Feb-21	560.00 Br per quintal	30.00 Br	5.36%	Megenagna
20-Feb-21	530.00 Br per quintal	5.00 Br	0.94%	Megenagna
13-Feb-21	525.00 Br per quintal	5.00 Br	0.95%	Megenagna
6-Feb-21	520.00 Br per quintal	10.00 Br	1.92%	Megenagna
30-Jan-21	530.00 Br per quintal	20.00 Br	3.77%	Megenagna
23-Jan-21	550.00 Br per quintal	5.00 Br	0.91%	Megenagna
9-Jan-21	545.00 Br per quintal	15.00 Br	2.75%	Megenagna
2-Jan-21	530.00 Br per quintal	20.00 Br	3.77%	Megenagna
26-Dec-20	510.00 Br per quintal	10.00 Br	1.96%	Megenagna
19-Dec-20	520.00 Br per quintal	--	--	Megenagna
12-Dec-20	520.00 Br per quintal	10.00 Br	1.92%	Megenagna
5-Dec-20	510.00 Br per quintal	10.00 Br	1.96%	Megenagna
28-Nov-20	500.00 Br per quintal	--	--	Megenagna
21-Nov-20	500.00 Br per quintal	--	--	Megenagna
16-Nov-20	500.00 Br per quintal	--	--	Megenagna
6-Nov-20	500.00 Br per quintal	--	--	Megenagna
31-Oct-20	500.00 Br per quintal	20.00 Br	4%	Megenagna
26-Oct-20	480.00 Br per quintal	--	--	Megenagna
19-Oct-20	480.00 Br per quintal	40.00 Br	8.33%	Megenagna
21-Sep-20	520.00 Br per quintal	90.00 Br	17.31%	Various Spots in Addis

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

GRADUATE PROGRAM IN PROJECT MANAGEMENT

SUPPORTED DISTANCE LEARNING PROGRAM

THE DEGREE OF MASTER OF ARTS IN PROJECT MANAGEMENT.

(Questionnaire)

ASSESSMENT ON THE CAUSES AND EFFECTS OF PRICE ESCALATION OF BUILDING CONSTRUCTION: IN THE CASE OF ADDIS ABABA DESIGN AND CONSTRUCTION WORKS BUREAU

Dear Sir/Madam,

The aim of this questionnaire is to obtain professional opinion on issues of price escalation and its adjustment in Addis Ababa design and construction works bureau. This is to identify factors that cause price escalation and their consequential effects on Addis Ababa design and construction works bureau and recommend possible remedial measures that minimize the problem (price escalation). This questionnaire is required to be filled with exact and relevant facts as much as possible. All data included in this questionnaire will be used only for academic research purpose and will be strictly confidential.

For unclear questions (if there is) or any questions related to the questionnaire use my addresses.

Sincerely

Submitted by: Kamil Hussen

Supervised by: Teklegiorgis Assefa. (PhD)

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Jun, 2023

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

Part one: General / Organization Information

1.1. Company Name (optional): _____

1.2. Type or origin of your organization (Please indicate with “√” when appropriate)

Project Owner/Client Consultant Contractor

1.3. Years of experience of the respondent:

Less than 5 years From 6 to 10 years

From 11 to 15 years Over 15 years

1.4. How many construction projects you have been involved in?

Less than 5 projects 6-10 projects more than 10 projects

Part Two: Factors causing price escalation

The following tables consist of lists of possible causes of price escalation in construction projects identified from literatures. Based on your experience what is the likely contribution of these factors to price escalation in Addis Ababa design and construction works bureau projects that you have involved in? Please express your opinion on rate of occurrence (frequency of occurrence) based on the representative numbers listed below by marking (√) under each preference.

0=Never, 1=Seldom, 2=Sometimes, 3=Often, 4=Always

S.N	Factors Causing price escalation	Rate of Occurrences				
		0	1	2	3	4
I. Internal Factors						
1	Delivery/procurement approach					
2	Project schedule changes					
3	Engineering & construction complexities					
4	Poor estimating					
5	Inconsistent application of contingencies					
6	Ambiguous contract provisions					
7	Improper planning &/or improper implementation of proper planning					
II. External Factors						
1	Local concerns and requirements					
2	Force Majeure					
3	Change in Legislation					
4	Fluctuation in money exchange rates					
5	Limited capacity of material producers					
6	Local or municipal regulations					

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

7	Increase in material cost (material fluctuation)					
8	Shortage of labors / skilled workers					

Part Three: Effects of price escalation

The following table consists of list of the possible effects of price escalation in construction projects identified from literatures. Based on your experience, among the following lists of potential effects of price escalation, please indicate the most recurrent effects in Addis Ababa design and construction works bureau projects based on the representative numbers listed below by marking (√) under each preference.

- 0- No significance 2- Average significance
 1- Minor significance 3- High significance 4- Extreme significance

S.N	Effects of price escalation	Rate of Occurrences				
		0	1	2	3	4
1	Delay					
2	Cancelled Projects					
3	Reduced Numbers of Bidders					
4	Higher Project Costs					
5	Cash flow (project financing) problem of the projects					
6	Dispute among parties					

Part Four: price escalation and adjustment

4.1. The following are lists of major construction inputs. Among them which items you have encountered price escalation in your organization? Please express your opinion below by making (√) under each box.

- Cement Reinforcement Equipment
Fuel labor

Others (please specify) -----

4.2. The following are lists of major construction inputs. For which items price escalation adjustment is made?

- Cement Reinforcement Equipment
Fuel labor

Others (please specify) -----

4.3. The two methods mostly practiced for adjustment is proven and formula (price indices). Which method you prefer as suitable for Addis Ababa design and construction works bureau?

- Proven (base price) method Formula (price indices) method

If you prefer Indices (formula) method of adjustment, how best is it to apply without any

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

established price indices by the responsible public bodies?

- Establish new local price indices and revise periodically
- Use foreign price indices

If any other, please specify?-----

4.4. Condition of contract is one of the main integral parts of contract document in construction contracts. Which contract form you/your firm use currently?

- Ministry of Works and Urban Development, MoWUD 1994 contract form

Public Procurement Agency

- PPA 2006 PPPAA 2011

Fédération Internationale des Ingénieurs-Conseils (FIDIC)

- FIDIC 1987 FIDIC 1999 FIDIC 2006, MDB (Multilateral Development Banks)

If any other, Please specify?-----

4.5. What do you think on current price escalation administration system (practice) on Addis Ababa design and construction works bureau?

- Excellent Very good Good Satisfactory Poor

Part Five: Price Escalation Adjustment Problems in the bureau

Below are numbers of Price Escalation Adjustment Problems in Construction Projects. From your experience, please express your opinion on rate of occurrences in construction projects based on the representative numbers listed below. (Please tick the appropriate box).

0= Never, 1= Sometimes, 2= Usually, 3= Frequently and 4= Most Frequently.

No.	Price Escalation Adjustment Problems	Rate of Occurrences				
		0	1	2	3	4
1	Clients resist honoring the escalation clauses					
2	Escalation clauses do not adequately compensate increase in prices					
3	Uncompensated increase in cost of construction materials					
4	Construction Price Indices may overestimate or under estimate the market conditions as at how prices have risen					
5	Selection of the most suitable index in using inflation indices					
If others, please specify in the following table						

Assessment on the causes and effects of price escalation of building construction: In the case of Addis Ababa design and construction works bureau.

1						
2						
3						

Part Six: managing/administering escalation

The following table consists of numbers of methods to manage/administer price escalation on Construction Projects. From your experience, please express your opinion on the degree of importance based on the representative numbers listed below. (Please tick the appropriate box).

0 - Unimportant, 2 – Important 4 – Extremely important
 1- Less important 3 – Very important

No.	Methods to manage/administer escalation	Rate of importance				
		0	1	2	3	4
1	Consider fluctuation/escalation clauses					
2	Bulk material purchases & suppliers partnerships					
3	Use Cost-Plus contracts					
4	Develop program-wide contingencies and risk management protocols					
5	Regular cost monitoring throughout the project					
6	Consider locally available material in design					
If others, please specify in the following table						
1						
2						
3						

THANK YOU!